

PLUS
13
DOS TIPS!

Dan Gookin Takes a Peek at MS-DOS 6.2

DOS RESOURCE GUIDE

The PC Productivity Magazine

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THE DOS WARS HEAT UP

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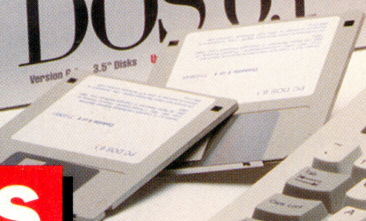
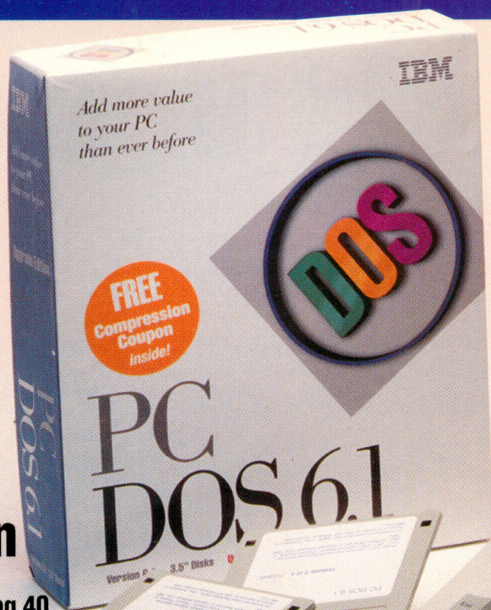
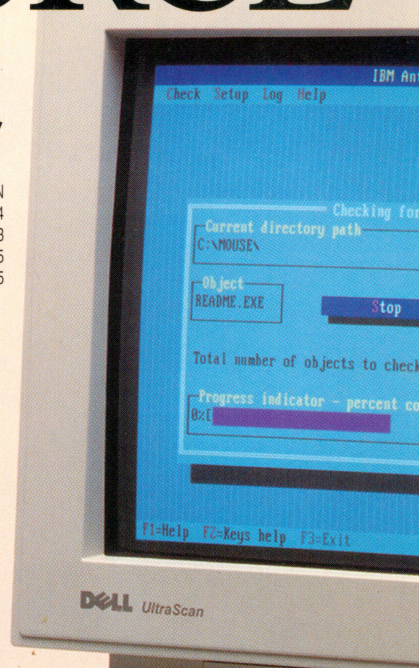
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The

Before you sink a penny into MS-DOS® 6, consider a better way to maximize the return on your PCs—the new PC DOS 6.1 from IBM.

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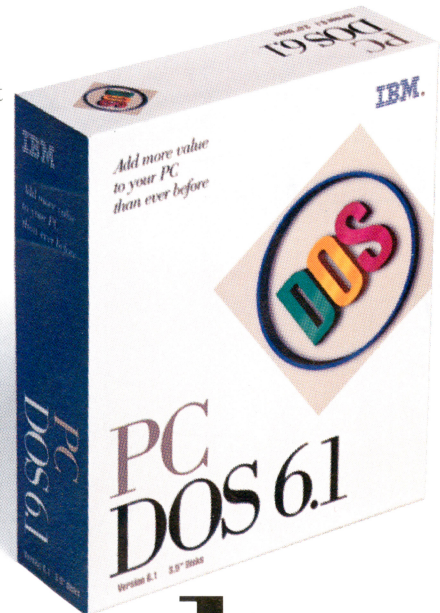
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Program scheduler	x	

market.



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PRINTED IN THE U.S.A.**EDITORIAL**

Smartening Up About DOS and Windows

by Michael J. Comendul

Do our writers waste too much time bashing Windows? Sometimes in their exuberance to identify with strongly opinionated readers, writers may be excessive with their criticism of Microsoft's Byzantine method of learning Solitaire, but this is unintentional.

At *DOS Resource Guide*, our best interest is served by telling you how to make the most of your time at the computer. That means telling you as much as we know about DOS. But part of that editorial franchise is showing you how to interact—albeit with polite reserve—with Windows. After all, unless you've rolled up those sample swatches, Windows and its wallpaper are now covering at least 8MB of your hard drive, probably more. For this, and other reasons, *DRG* is producing a special newsstand issue about running DOS and Windows together, due out next month. I wouldn't want readers to think we are abandoning them, so let me explain.

Most of us already own Windows. I can't name a PC vendor that is not offering Windows on its computers, including IBM and its new Ambra line. But unlike those readers who think an impassable schism is developing between DOS and Windows, I think these two systems are coming closer.

Microsoft is testing a new version of Windows, and a new version of DOS. The new Windows 4.0 will not require DOS as a separate product, however that doesn't mean your valuable DOS programs will not run under Microsoft's new interface (code-named Chicago). Nor does it *necessarily* mean you will no longer be able to run a program from the command line. Some speculate these two upgrades are the same program; the face you see at bootup will depend only on which side of the bed you sleep. In support of this theory come unconfirmed reports from test sites indicating that both DOS 7 and Windows 4.0 will solve one of the most limiting features of the original DOS: skimpy filenames.

DOS and Windows have been coming together in other ways for a few years now. Think of those early reports of memory problems with Windows 3.0 that were solved only by using EMM386.EXE. Windows owners were scouring their Windows directory and supplementary disks trying to find this memory manager, but it wasn't there. EMM386.EXE was one of the new utilities added to MS-DOS 5—a nice piece of marketing. Those of you who already have upgraded to DOS 6 have a directory packed with Windows versions of utilities that will load by default if DOS senses Windows on your hard drive.

But still, none of the above means the DOS world is shrinking. A computer owner today simply has more choices than yesterday. If you love your DOS applications, cling to them. If you enjoy tinkering at the command line, as some like hovering over the carburetor of a vintage Chevy, go ahead. Windows will come and Windows may even go, but you will find no better introduction to the skills of computing than learning to use DOS. ■

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FYI

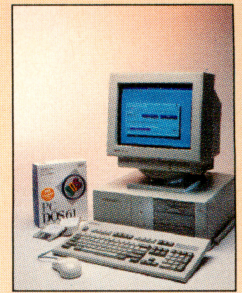
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COVER PHOTO BY LARRY DUNN

DRG

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How to Contact The Editors

DOS Resource Guide welcomes letters, complaints, and submissions from readers. The easiest way to reach the editors is the U.S. mail: DOS Resource Guide, 80 Elm St., Peterborough, NH 03458. All letters to the editor and questions are understood to be submitted for publication unless otherwise indicated. You can reach our staff electronically over CompuServe at 75300,2361. Please include your complete address and a daytime phone number on your correspondence.

Also, you can reach the editors through the DRG Bulletin Board System (603-924-3181). To connect, set your modem and software to 8 data bits, no parity, and 1 stop bit. DRG's BBS lists all of the QBasic and shareware programs mentioned in these pages. Shareware listed on the DRG BBS are products protected by copyright law. You are welcome to try these programs. If you find them useful, you are asked to register and pay the applicable fees to the programs' respective owners.

DRG encourages the submission of DOS tips, QBasic programs, and batch-file articles from readers. Please submit all material on disk in ASCII format together with a double-spaced printed copy to our offices. The magazine cannot be responsible for the return of these manuscripts, unless an appropriate mailer and return postage are enclosed.

DRG makes every effort to verify its articles and programs, but the magazine assumes no responsibility for any damages because of errors or omissions in our articles. Corrections to listings or articles are printed as soon as possible.

Letters to the Editor

The Triumph of Good

When I came across *DRG*, I was shocked to find it totally devoted to DOS—how singular can you get? I say BRAVO! Yours is a useful publication, so unlike the admongers that prevail in this market.

Gene Berry
Lincoln Park, Md.

An Enlightening Publication

I bought my first PC—a Toshiba T1800 laptop—in November, 1992. I've had my second—a 486DX 33MHz, 8/250MB behemoth—for two weeks now. I mostly use DOS applications such as WordPerfect 5.1.

DOS Resource Guide has been quite a revelation for me. It has helped me solve some problems I had understanding my DOS manual. Indeed, I am a very satisfied subscriber to your magazine.

Leif Lagerstedt
Uppsala, Sweden

Well Worth the Cover Price

Over the years, my purchases of computer magazines have dwindled to almost none. Then at my local newsstand, *DOS Resource Guide* caught my eye. I leafed through it, decided it had merit,

and bought it. I found every article in it to be interesting and informative. Many of us DOS users have been needing you for quite a while.

E. T. "Rags" Ragland
Archdale, N.C.

No Reviews!

Please don't start including hardware and software reviews in *DOS Resource Guide*. There already are numerous magazines that contain reviews. But that kind of coverage just fills up the page space needed for good, in-depth advice on this crazy operating system of ours.

I began my subscription to *DRG* because of its lack of reviews. And the word is spreading: Our user's group is talking about you. Keep the faith.

Philip E. Stern
Torrance, Calif.

Multitasking Revisited

How could you forget about what I consider to be the most popular and powerful DOS multitasker ("Managing Two Jobs at Once," *DRG*#11, page 67)? The Software Link's PC-MOS (Norcross, Ga.) can work with 5, 10, 20—who knows how many—DOS tasks at one time. In addition, 32 COM

ports can answer 32 phone lines at once, and several printers can be printing simultaneously. You also can have a string of Ethernet-linked colleagues computing and printing off of local machines. And all this is just what I do on a daily basis with PC-MOS.

PC-MOS is not a DOS add-on. It is a complete operating system in and of itself—MS-DOS is not required. You can see it running every day at your local United States Post Office.

R.J. Burke
Pt. Roberts, Wash.

You've answered your own query. PC-MOS is an operating system unto itself, not a DOS add-on.—Eds.

Dump DOS 6 and DoubleSpace

Today I purchased my first issue of *DOS Resource Guide* (#11), and I am enjoying it immensely. In particular, I was pleased to read the editorial [page 1] on the problems with DOS 6's DoubleSpace. I tried that utility on both my machines—a desktop 286 with 2MB of extended memory and a laptop 286—as well as a fresh-from-the-factory 386, and found problems on each.

Vertisoft's response to your inquiries sounds rather elitist, particularly when referring to "compression illiterate" users. In my tests, I ran a CHKDSK /F on a weekly basis prior to installing DOS 6, and I also ran PC Tools's Mirror [Central Point Software]. Moreover, there were no files to defragment on the new 386. On all three computers, the disk crashed or

Let Us Hear from You

DOS Resource Guide wants to know about your computing trials and tribulations. The editors welcome your correspondence and encourage you to share your DOS tips or criticize ours.

You can reach us at *DOS Resource Guide*, 80 Elm St., Peterborough, NH 03458, or contact us through CompuServe (75300,2361) or the *DRG* Bulletin Board (603-924-3181).

WINDOWS COVERAGE: THE DEBATE CONTINUES

Don't Shut Out Windows Users

I can understand *DRG's* desire to concentrate on DOS, rather than Windows, users. After all, there is a glut of glossy magazines dedicated to the Windows crowd, and your straightforward publication provides a genuine service.

Indeed, even though I spend 90 percent of my computer time in the Windows environment, I am still a faithful *DRG* reader. The 10 percent of my time spent in DOS is every bit as important as the other 90. If I couldn't run CHKDSK, or if I had no practical knowledge of how an AUTOEXEC.BAT or CONFIG.SYS file worked, I'd be unable to get much done in Windows. A minimal understanding of batch files, memory, and the various ways DOS works under the hood of the Windows shell is essential—and I have yet to see a better treatment of these issues than in *DRG*.

But please don't overlook me and my GUI brethren. Perhaps, every now and again, you could continue to include an article that addresses aspects of DOS that are pertinent to us more-than-occasional Windows users.

*Chris Dichtel
Oakland, Calif.*

Up with *DRG*, Down with Windows

Congratulations on a first-rate publication. I wish someone

would produce something similar here in England.

I have tried Windows—both versions 3.0 and 3.1—but I can't see what either has to offer. And why should I clutter up my desk with a rodent when a keystroke will do? After all, I can switch with DesqView [Quarterdeck], and although I haven't tried Software Carousel [SoftLogic Solutions], I understand that you can move quickly between programs with it. I still have 16MB uncluttered on my C drive, and my system doesn't crash every few hours.

As far as I'm concerned, DOS does it for me. Keep up the good work, and down with Windows.

*G. P. Dunphy
West Wickham, Kent, England*

More on Windows, Please

I am just one DOS user in a very long line of satisfied *DRG* readers. I feel that I must take exception, however, to the letter from Jim Adams in your September issue [*DRG*#11, "Letters to the Editor"].

Yes, DOS is a very important platform, but having recently added Windows 3.1 to my system, I would like to make a few points. Obviously, a user could never give up DOS; however, DOS shouldn't control you to where you turn a blind eye to any other platform. There is no rea-

son why DOS and Windows cannot coexist.

It seems to me that, as one of the biggest selling programs on the market, Windows is here to stay. And don't forget that programmers recognize Windows to be the platform of the future.

I believe it would be a mistake for *DRG* not to provide a Windows section, particularly on how it relates to DOS. I was very disappointed that there were no Windows articles in this issue.

*Dane E. Watson
London, Ontario*

"Fashionable" Windows

I consider myself to be an advanced-beginner computer user (depending upon whether my batch files and QBasic—very basic!—programs work the first time). The friends who helped me get started in computing say they have created a monster. They lean more toward store-bought programs and only build batch files when they need to, instead of for fun as I do.

Windows came with my computer. I use it, not because I like it, but because I think it's going to be a long-lasting "fad." As a keyboard user, I find it frustrating to use that silly mouse. Windows information belongs in its own publication.

*Don Hankinson
Gig Harbor, Wash.*

many programs simply did not work properly. I was stuck performing a FORMAT C:.

I'm not a Microsoft basher. In the past, I've used DOS 3.3, 4.x, and 5.x, and my mouse is a Microsoft

7.x. But I don't have the time to troubleshoot someone else's problems. I was leery enough of DOS 6 to scrap it.

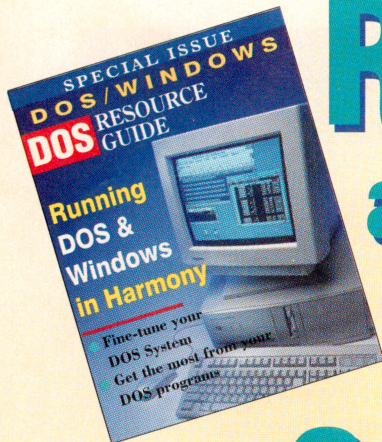
For those DOS 6 users who have become disenchanted, I recom-

mend Novell's DR DOS 6.0. It's a breeze to install, and the SSTOR disk-compression and DISKOPT utilities really work.

*John Lapham, Sr.
Lynnwood, Wash.*

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Tips from Readers

Improving on Deleting

Because I have over 600MB of compressed and cluttered hard drive space, I was very interested in the *DRG#10* tip, "Deleting Files with QBasic" [page 34]. I did find a problem in the listing for DELBAK.BAS, however: Using the DIR command to create the file DUMPSTER means that the paths to the files slated for deletion aren't included with the filenames. This forces the computer to look for the files in the root directory, which is fine if all your BAK files are there, but that doesn't happen very often.

My program, CLEAN.BAS, employs the CHKDSK/V and FIND commands. CLEAN.BAS also includes a path to the files, a prompt for the file extension type to delete, and a safeguard against entering EXE, COM, or SYS files.

To use CLEAN.BAS, enter the type of files you want to delete (BAK, TMP, OBJ, and so on). Don't place a period before the file extension; the program does that. When the program search ends, you are shown a list of the files slated for deletion and asked to verify that you want to delete them. If the list is long, MORE displays it one screen at a time.

*George Kaiser
Aurora, Ind.*

To Update or Not to Update

I had been searching for a program to run antivirus software and CHKDSK at regular intervals when TICKLER.BAT [*DRG#10*, "Automated CHKDSK Minimizes Problems," page 33] caught my attention. But

because the program is a batch file called from AUTOEXEC.BAT and must create and delete numerous temporary files, it is inherently slow.

I thought that writing a program in assembly language might be a better solution, so I came up with DATECHK.COM. It creates and updates a single file, DATE.FIL, whose date stamp is used to check when the last update was made. DATECHK.COM returns an error code of 1 if CHKDSK or another operation is

needed and an error code of zero if all is well.

Like TICKLER.BAT, DATECHK.COM must be used in a batch file. However, as it is an 82-byte COM file, DATECHK.COM does speed up things, especially because only one file is manipulated. If a disk optimizer is used to group all the start-up files (including DATECHK.COM), and a sufficiently large disk cache is employed, my program will save you time at bootup.

CLEAN.BAS, an improved version of DELBAK.BAS, helps you clean unwanted files from your hard disk.

```
BEGIN:
CLS
CHDIR "C:\\"
LINE INPUT "Enter file type to delete "; FILE$
IF FILE$ = "COM" OR FILE$ = "EXE" OR FILE$ = "SYS" THEN BEEP:
    GOTO BEGIN
IF FILE$ = "" THEN END
CLS
KILL$ = "FIND" + CHR$(34) + "." + FILE$ + CHR$(34) + "/I"
REDIRECT$ = ">C:\HOLDFILE"
CLS
PRINT "Searching for "; FILE$; " FILES"
SHELL "CHKDSK/V|" = KILL$ = REDIRECT$
CLS
SHELL "TYPE C:\HOLDFILE | MORE"
COLOR 15
PRINT
PRINT "Delete the above files (Y/N)?"
DO
CHOICES$ = INKEY$
CHOICES$ = UCASE$(CHOICES$)
LOOP UNTIL CHOICES$ = "Y" OR CHOICES$ = "N"
IF CHOICES$ = "Y" GOTO DELETE
KILL "HOLDFILE": GOTO BEGIN
DELETE:
OPEN "C:\HOLDFILE" FOR INPUT AS 1
DO UNTIL EOF(1)
LINE INPUT #1, KILLFILE$
KILL KILLFILE$
LOOP
CLOSE
KILL "HOLDFILE"
COLOR 7
GOTO BEGIN
```

End

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Understanding DOS is the key to effective PC-computing. But even if you've tried to learn DOS on your own, wrestled with its manual, purchased a guidebook, or taken a course, you're probably still frustrated and confused.

Relax, you're not alone!

One estimate puts the number of MS-DOS-run computers in the marketplace at 70 million. But how many DOS experts are there?

Darn few, and here's why.

Since late 1980, Microsoft Corp.'s MS-DOS, the essential software ingredient of the IBM PC-compatible, has changed many times. Along the way, the operating system that began as 22 cryptic commands has grown to about 100 equally cryptic commands, drivers, and programs.

DOS RESOURCE GUIDE explores DOS's hidden secrets, untangles the twisted technical prose of manuals, and tells you in clear language how to use DOS.

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GUIDE, you'll find articles about using DOS commands, about managing your computer's memory, and maintaining order on your hard disk.

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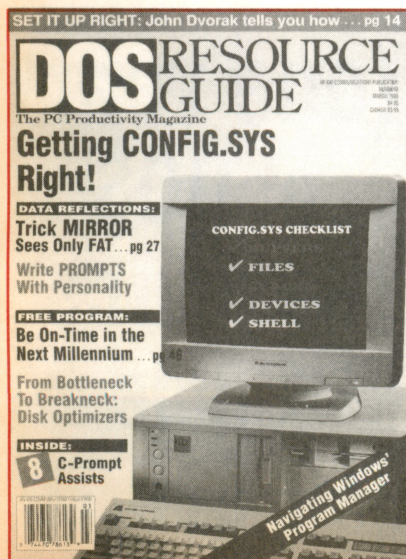
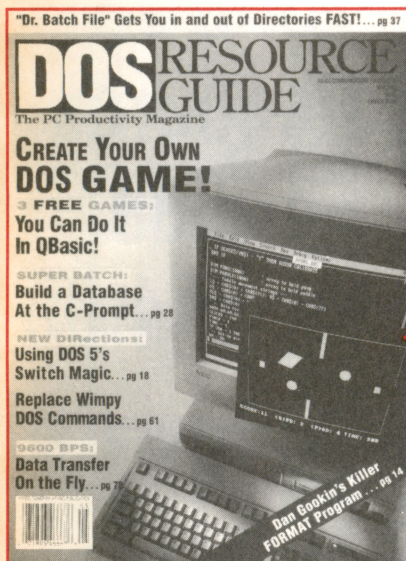
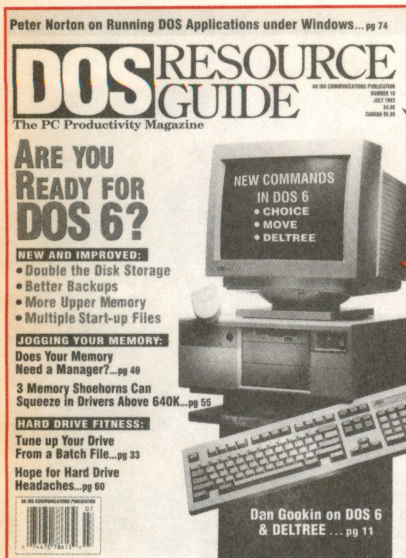
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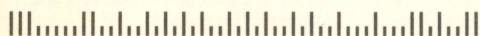
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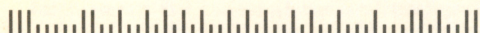
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This DEBUG script creates DATECHK.COM, a program that can determine quickly whether a monthly computing chore should be performed. Note that the line numbers are for reference only.

```

1: A100
2: PUSH CS
3: POP DS
4: MOV AH,4E
5: MOV DX,0140
6: MOV CX,0000
7: INT 21
8: JB 012D
9: MOV DX,[0098]
10: MOV CL,05
11: ROR DX,CL
12: AND DX,000F
13: MOV [0150],DL
14: MOV AH,2A
15: INT 21
16: CMP DH,[0150]
17: JNZ 012D
18: MOV AX,4C00
19: INT 21

20: MOV DX,0140
21: MOV CX,0000
22: MOV AH,3C
23: INT 21
24: MOV AX,4C01
25: INT 21
26:
27: F13C 13F 90
28: A140
29: DB "C:\DATE.FIL"
30:
31: F14B 152 00
32: RCX
33: 52
34: NC:\DATECHK.COM
35: W
36: Q

```

End

Note that you may hide DATE.FIL if you wish. Simply change lines 6 and 21 to MOV CX,0002. If you want to use a name other than DATE.FIL, enter the new filename and path between the quotes in line 29. (The new name, including the drive and path, may not exceed 17 characters. If you change the length of the name, you must insert F140 152 00 between lines 27 and 28 and delete line 31.) You may modify the name of the COM in line 34.

Marc Scheffler
Malartic, Quebec

Identifying Hidden Files

It appears to me that DRG has made the same mistake twice in DRG#7—on page 11 and page 54. Contrary to popular belief, the third hidden file reported when you run CHKDSK is not the volume label, but rather a Windows virtual-memory swap file (386SPART.PAR).

As you can see in the following CHKDSK and DIR listings, the three hidden files that DOS reports are IO.SYS, MSDOS.SYS, and the Windows swap file. The volume label is part of the boot record, and CHKDSK doesn't show it as a hidden file. (The Norton Disk Edit pro-

gram does show the volume label as a file, however.)

Lee Moberg
U.S.S. Nimitz

You might be interested to know that you may encounter several other hidden files. DBLSPACE.BIN, which starts up DOS 6's DBLSPACE disk-compression program, is stored as a hidden file in the root directory of your bootup disk. And many utilities, such as Symantec's The Norton Utilities, write hidden files to the root directory.

Windows employs two types of virtual-memory swap files. A temporary swap file resides on your disk only when Windows is running; you can see it in a directory listing while running a DOS session under Windows. A permanent swap file, which is much faster (but which should never be stored on a compressed disk volume), is listed in your root directory whether

or not Windows is running.—Eds.

What to Do with a Load of BAKs?

You don't need an elaborate batch file to clear out accumulated BAK files in a \BATCH directory. You may eliminate files that simply take up space by tacking on the following lines after the :END label of each batch file:

```

CTTY NUL
DEL filename.BAK
CTTY CON

```

The filename is the name of the file just executed, and the two CTTY commands prevent the error message "File Not Found" from appearing on screen if the file doesn't exist.

Another approach is to place the following modification after the :END label of the batch files that you use most frequently:

```

CTTY NUL
DEL *.BAK
CTTY CON

```

CHKDSK reports the existence of three hidden files in the root directory.

C:\CHKDSK

Volume DP1_MOBERG
Volume Serial Number is 3D5E-17FF

```

85889024 bytes total disk space
8257536 bytes in 3 hidden files
182272 bytes in 76 directories
59473920 bytes in 1728 user files
17975296 bytes available on disk

```

DIR reports the three hidden files.

C:\DIR/A:H

Volume in drive C is DP1_MOBERG
Volume Serial Number is 3D5E-17FF
Directory of C:\

```

IO      SYS      33430 06-14-91 12:00p
MSDOS   SYS      37394 06-14-91 12:00p
386SPART PAR 8183808 07-18-93 12:07p
3 file(s)      8254632 bytes
17975296 bytes free

```


This produces the same results as the first solution but doesn't require you to add commands to every file in your \BATCH directory. The only risk to this method is the possibility of losing a batch file and at the same time inadvertently wiping out its BAK file.

Frank Shutts
Tucson, Ariz.

We don't think that it's a good idea to delete BAK files automatically by adding a few lines to a batch file. At one time or another, the existence of a BAK file has saved each of us from a potential catastrophe, because we did something dumb, such as saving a nearly empty document with the same name as an important file. We advise keeping BAK or BK! files on hand until a project is finished, and you're ready to move the original into long-term storage.—Eds.

A Kinder, Gentler DAY.BAT

The tip entitled "Pick a Day, Any Day," which appeared in DRG's October 1993 Special Issue [page 38], contained a listing for DAY.BAT that I found confusing.

As published, DAY.BAT uses *numbers* to represent the days of the week. As a result, when it is run, the program displays messages such as this one:

```
12 31 1993 is 5'sday
```

and you must mentally convert *5'sday* to *Friday*.

To simplify matters, I modified the program listing to return the *names* of the days of the week. I also added code that automatically adjusts the date algorithm for January and February entries and flags a February 29 entry for all nonleap years.

Note that some of my additional code lines work only in QBasic; GW-Basic users should remember to substitute the following single line of code for the six lines shown

between the REM statements in BETTRDAY.BAT:

```
IF YR MOD 4 THEN IF MO = 2 AND
DA = 29 THEN PRINT "Invalid
entry. %3 is not a leap year"
:SYSTEM > DAY.BAS
```

I still have one problem, however. BETTRDAY.BAT breaks down for the year 1900 (and any other year divisible by 4 that is not a leap

year). The rule about leap years is as follows: A year must be divisible by 4, unless it is also divisible by 100. An exception to this exception states that if the said year is also divisible by 400, it is then a leap year.

Best of luck attempting to program this.

John Wolfskill
Peterborough, N.H.

BETTRDAY.BAT, an improvement on DAY.BAT, takes a date and reveals the day of the week on which it will fall according to the Gregorian calendar.

```
ECHO OFF
IF "%3"==" " GOTO HELP
IF "%2"==" " GOTO HELP
IF "%1"==" " GOTO HELP
ECHO CLS : >> DAY.BAS
ECHO D$(0) = "Sunday" : >> DAY.BAS
ECHO D$(1) = "Monday" : >> DAY.BAS
ECHO D$(2) = "Tuesday" : >> DAY.BAS
ECHO D$(3) = "Wednesday" : >> DAY.BAS
ECHO D$(4) = "Thursday" : >> DAY.BAS
ECHO D$(5) = "Friday" : >> DAY.BAS
ECHO D$(6) = "Saturday" : >> DAY.BAS
ECHO MO = %1 : DA = %2 : YR = %3 >> DAY.BAS
REM *** GW-Basic users: Don't type lines between REMs. ***
ECHO IF YR MOD 4 THEN >> DAY.BAS
ECHO IF MO = 2 AND DA = 29 THEN >> DAY.BAS
ECHO PRINT "Invalid entry. %3 is not a leap year" >> DAY.BAS
ECHO SYSTEM >> DAY.BAS
ECHO END IF >> DAY.BAS
ECHO END IF >> DAY.BAS
REM *****
ECHO IF MO = 1 THEN YR = YR - 1 : MO = 13 >> DAY.BAS
ECHO IF MO = 2 THEN YR = YR - 1 : MO = 14 >> DAY.BAS
ECHO D1$ = "%1 %2 %3 is " >> DAY.BAS
ECHO D2$ = D$((YR+YR\4-YR\100+YR\400+2.6*MO+1.2+DA) MOD 7): >> DAY.BAS
ECHO PRINT D1$ + D2$ : >> DAY.BAS
ECHO SYSTEM >> DAY.BAS
QBASIC /RUN DAY.BAS
DEL DAY.BAS
GOTO END
: HELP
ECHO To find the day of the week for a particular date, type
ECHO DAY followed by the number of the month, the number of the
ECHO day, and the year. For example, to find out which day July
ECHO 11, 1993, falls on, type:
ECHO\
ECHO DAY 7 11 1993
ECHO\
ECHO The program will display this message:
ECHO\
ECHO 7 11 1993 is Sunday
ECHO\
: END
```

End

Best of the Batch

A Pair of Deletion Tricks

How do you delete a bunch of files with a common extension when they're scattered all over your hard drive? Can you, for example, quickly erase all of your temporary (TMP) or backup (BAK) files without a lot of subdirectory jumping?

MS-DOS doesn't provide a push-button solution. It does, however, give you enough tools to make your own. I'll explain two methods—one using the DIR command and your word processor, the other using a batch file and QBasic.

The word processing method is simpler, but the trade-off is that you must do part of the operation manually. The QBasic solution requires a bit of simple programming, but it automates the process: You type DOFILE [*filename*], and the program does the rest of the work for you.

Both methods use DIR and two of its switches to put the files you want to delete into a text file. If you use the first method, you then use your word processor to put a DEL command in front of each line. The resulting file is a batch file that, when run, erases each of the files you specified. If you use the second method, QBasic reads each line of the text file and kills the files listed.

Neither way makes sense if you're killing only a few files or if they're grouped in a couple of directories. They save time, however, when you have dozens of files in dozens of directories.

Directory Directions

I'll start with the DIR command, the key to both solutions. Say, for ex-

ample, that you want to delete all PRINT.TMP files on drive C. You can find the files by going to your root directory and typing this command at the DOS command line:

```
DIR PRINT.TMP /S /B
```

The /S switch tells DIR to include all directories below the current directory in its search for files named PRINT.TMP. The /B switch tells DIR to list the directory in brief form, without headings or summary information.

Now add a greater than sign (>) and the filename KILL.BAT:

```
DIR PRINT.TMP /S /B >KILL.BAT
```

The greater than sign is a redirection symbol. Instead of displaying the directory on your screen, DIR sends the directory to a file called KILL.BAT. This file might look something like this:

```
C:\PRINT.TMP
C:\IS\PRINT.TMP
C:\QPRO\LOGS\PRINT.TMP
C:\QPRO\MISC\PRINT.TMP
C:\WORD\PRINT.TMP
C:\WORD\OFFICE\KSC\J201\PRINT.TMP
C:\WORD\OFFICE\KSC\J201\PLANS\
  PRINT.TMP
C:\WORD\OFFICE\SCRIPTS\PRINT.TMP
```

The file is ready for step 2. At this point, the word processing and QBasic methods diverge. I'll describe the word processing solution first.

Search and Replace

Load your word processor and retrieve KILL.BAT. Using your editor's search-and-replace feature, replace

all instances of C: with DEL C:. Each line will look something like this:

```
DEL C:\PRINT.TMP
```

Replace the old version of KILL.BAT with the edited file. Quit your word processor and type KILL. The batch file reads each line, finds the file, and deletes it.

If you're not sure how to search and replace with your word processor, you may use EDIT, the full-screen editor that comes with DOS 5 and later. Follow these steps:

- Type EDIT KILL.BAT.
- Press Alt-S to pop up the Search menu.
- Select the Change option.
- Type C: in the Find What box.
- Press Tab and type DEL C: in the Change To box.
- Press Tab until you're on the Change All button and press Enter.
- Press Alt-F to select the File menu and type S to save your edited version of KILL.BAT.
- Press Alt-F and then type X to quit EDIT.
- At the DOS prompt, type KILL.

One note of caution: If the files that you wish to kill don't have extensions, put a period after the filename when you create your original file with DIR. If you want to kill files called README, for example, the command looks like this:

```
DIR README. /S /B >KILL.BAT
```

If you omit the period, DIR finds all files starting with README, no matter their extension. Thus, you

DOFILE.BAT creates a text file, **KILL.DAT**, that lists the files to be deleted. It then jumps to **QBasic** and runs **DOFILE.BAS**, which performs the deletions. (The line numbers are for reference only; don't include them when typing in the program.)

```

1 CLS
2 @ECHO OFF
3 IF "%1"="" GOTO INVALID
4 DIR %1. /S /B >KILL.DAT
5 QBASIC /RUN DOFILE
6 DEL KILL.DAT
7 GOTO END
8 :INVALID
9 @ECHO Invalid filename.
   Returning to DOS.
10 ECHO.
11 PAUSE
12 :END
13 @ECHO Done.
```

End

accidentally might kill files called **README.TXT** and **README.DOC**.

The Programming Solution

The other solution consists of a batch file and a **QBasic** program, which I call **DOFILE.BAT** and **DOFILE.BAS**, respectively. The syntax for **DOFILE.BAT** is as follows:

```
DOFILE [filename]
```

where *[filename]* is the name of the file you want to kill.

DOFILE.BAT is built around the **DIR** command used for the first method. This command is issued in line 4. Instead of creating **KILL.BAT**, however, **DOFILE.BAT** creates **KILL.DAT**. This is the text file that the **QBasic** program, **DOFILE.BAS**, reads.

Line 3 looks at the variable **%1** to see if it is empty. If so, program control passes to the subroutine **INVALID** in line 8, and the batch file ends. Without this trap, **DOFILE** lists every file on your drive if you accidentally type **DOFILE** without a filename.

The filename is passed to the variable **%1** in line 4. Note that the variable is followed by a period. This prevents you from deleting the wrong files when you want to delete a group of files that lack extensions.

Let's say, for example, that you type the following to delete a group of files named **README**:

```
DOFILE README
```

If the period after the **%1** variable were omitted, DOS would find every file with the specified name, whether or not it included an extension. That is, it would find not only **README** but also **README.DAT** and **README.COM**. With the period, only files without extensions go into **KILL.DAT**. If the filename has an extension, DOS ignores the second period.

When the batch file finishes routing the filenames to **KILL.DAT**, it runs **DOFILE.BAS** in line 5, which reads **KILL.DAT** and kills the files listed there. When done, **DOFILE.BAS** returns to the batch file, picking up at line 6. **DOFILE.BAT** then kills **KILL.DAT**—a bit of housekeeping—and returns to DOS.

DOFILE.BAS begins by giving you a

list of the files that you've decided to delete. It uses the **SHELL** command to go to DOS and execute the **TYPE** command. The pipe sign (**|**) followed by **MORE** keeps long lists from scrolling off the screen before you have a chance to read them.

Line 13 asks if you want to continue with the program. This safety measure is designed to prevent you from killing the wrong files.

Lines 16–24 find and kill the files. Line 16 opens **KILL.DAT**. Line 17 begins a **DO...LOOP** structure that processes each line and kills or keeps the file listed in that line. Line 18 reads the line into the variable **DEADFILE\$**. Lines 19–21, further protection against accidental deletion, show you the name of each file and ask you to type **Y** to kill it. When the **DO...LOOP** finishes, line 25 closes **KILL.DAT**. Line 27 ends the program and returns you to the batch file, **DOFILE.BAT**.

—Eric Maloney
Peterborough, N.H.

DOFILE.BAS reads the text file **KILL.DAT**, created with **DOFILE.BAT**, and kills the files listed in it. (The line numbers are for reference only; don't include them when typing in the program.)

```

1 'This Basic program is loaded and run from DOFILE.BAT.
2 '
3 'For the program to run properly, you must first use
4 'DOFILE.BAT to create KILL.DAT, the list of files to be killed.
5 '
6 '
7 CLS
8 STARTHERE:
9 PRINT "Here is a list of the files that you have selected:"
10 PRINT
11 SHELL "TYPE KILL.DAT | MORE"
12 PRINT
13 PRINT "Do you wish to continue (Y/N)";
14 CONTINUE$ = UCASE$(INPUT$(1))
15 IF CONTINUE$ <> "Y" THEN GOTO NODELETE
16 OPEN "I", 1, "KILL.DAT"
17 DO
18     INPUT #1, DEADFILE$
19     PRINT "You are about to kill "; DEADFILE$
20     PRINT "Do you wish to proceed (Y/N)";
21     ANSWER$ = INPUT$(1)
22     IF ANSWER$ = "Y" OR ANSWER$ = "y" THEN KILL DEADFILE$
23     PRINT
24 LOOP UNTIL (EOF(1))
25 CLOSE 1
26 NODELETE
27 SYSTEM
```

End

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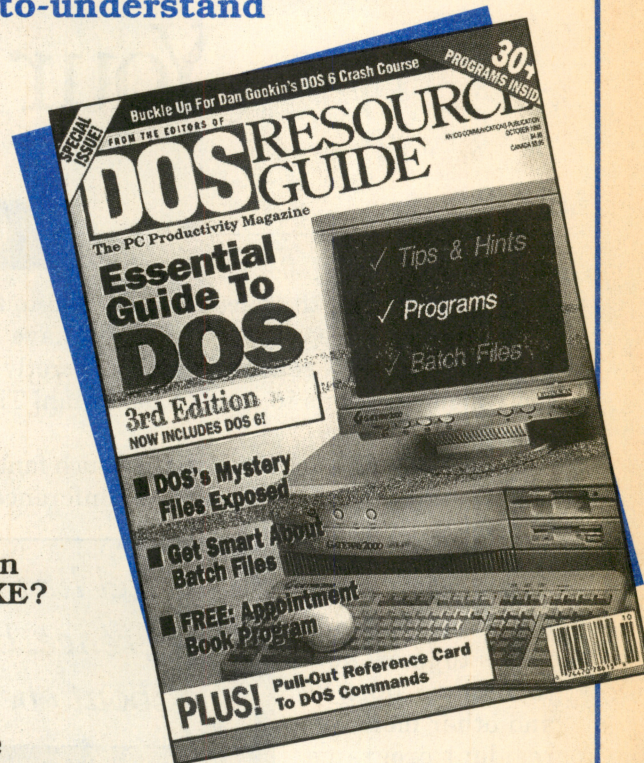
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READER FORUM

Addressing Your Concerns

by Hardin Brothers

Some months, the questions directed to this department are all related. I even have had visions of *DRG* readers meeting secretly, deciding which questions to send to us. ("Hah! This will stump them!")

But this month's collection dispels such fantasies. I feel like the President at a press conference, bombarded with questions about every topic under the sun. A Canadian reader wants to know how to remove DOSKEY and other memory-resident programs to free up memory, while another needs help swapping parallel ports. Two readers called me on the carpet for an error in last month's issue. (Presidents don't make mistakes, you know—the dynamics of fluid developments merely require a new and viable course of action.)

Finally, Herbert Mosley of Manhattan Beach, Calif., sent 18 excellent questions, each with several "follow-up questions," as the press-conference reporters call them. Mosley's first set is about emergency disks; specifically, what they should contain, how often you should update them, and how you should store them. He also wants to know under what circumstances you need them.

I feel like the President at a press conference, bombarded with questions about every topic under the sun.

All the Necessary Precautions

To answer the last question first, preparing an emergency disk prevents disaster if your computer locks up or refuses to boot. The causes of such a catastrophe are varied.

When you turn on your computer, its internal program, the ROM BIOS, performs a number of system checks and then loads an operating system. Most computers look first to drive A for the operating system. If the drive has no disk in it, the machine then searches for an oper-

ating system on the hard disk. For some 90 to 100 million users, the operating system loaded into memory is DOS.

After DOS does some housekeeping, it executes the commands in its CONFIG.SYS file. It finishes its preparations by running the AUTOEXEC.BAT file.

Now suppose your CONFIG.SYS file contains an error or loads a buggy device program. Such an error could lock up your system. So you press the reboot button and wait for the computer to boot up again. Once more, DOS executes CONFIG.SYS and locks up your computer. No matter what you try, your computer locks up whenever you boot it up.

Errors in AUTOEXEC.BAT can cause problems of this sort, but you sometimes can exit early by pressing Ctrl-Break at exactly the right moment during boot-up. The most common cause of this lockup is an installation program that changes your configuration files and makes a mistake. Or, sometimes you make a typographical error when you edit one of the files. To be honest, when your computer won't boot up, you really don't care what's to blame. You just want to correct the problem and begin working.

Want to Know More?

If you have a question, or need further help with something that has appeared in DRG, write:

**Reader Forum
DOS Resource Guide
80 Elm St.
Peterborough, NH 03458**

The solution is simple if you have prepared an emergency disk. Just pop it into drive A (the one that the BIOS checks before it reads the hard drive), reboot once more, and your troubles should be over. You then can fix the offending configuration file and be back in business in just a minute or two...if you prepared the disk properly.

DOS 6 users can avoid some of the potential problems of "farkled" configuration files by pressing F5 just after the ROM BIOS performs its hardware checks. This instructs DOS to skip all of the commands in CONFIG.SYS and AUTOEXEC.BAT. Pressing F8, instead of F5, however, instructs DOS to prompt you before executing each command in CONFIG.SYS. At each prompt, you can type Y or N to tell DOS whether to execute each command, Esc to carry out all remaining commands, or F5 to bypass all remaining commands.

Even with DOS 6, however, you should have an emergency disk. Over time, the bootup sections of your hard disk can become damaged. With the aid of an emergency disk, you will still be able to start your computer and use your data until you have time to reformat the hard drive and reload it from your backup disks.

To make an emergency disk, put a new disk into drive A. The disk should be rated at the top capacity of your drive. For most 5.25-inch drives, that means 1.2MB; for most 3.5-inch drives, get a 1.44MB disk. Format it with the SYSTEM option, typing the command `FORMAT A: /S`. Then use the DIR command to make sure that COMMAND.COM is on the disk. Some versions of DOS copy it when you use the /S option; others do not.

If you use a disk-compression utility, such as DOS 6's DBLSPACE or Stac Electronics' Stacker, make sure the emergency disk has the necessary files to turn on the compression engine during bootup. For DBLSPACE and Stacker 3.1 (used with DOS 6), that means copying a hidden file called DBLSPACE.BIN from drive C to drive A. To do that, of course, you first need to unhide the file by typing a command such as the following:

```
ATTRIB -H C:\DOS\DBLSPACE.BIN
```

After you copy the file, you can hide it again, using this command:

```
ATTRIB +H C:\DOS\DBLSPACE.BIN
```

You should copy your AUTOEXEC.BAT and CONFIG.SYS files to the emergency disk, as well. You might want to give them an extension of SAV on the floppy disk and write other, shorter configuration files for use when you boot from the disk. If your start-up files are long and complicated, chances are you won't be able to fit all of the programs that they refer to onto the same disk.

You also should save a copy of your CMOS drive table on the disk. You can purchase utilities that will do this for you, but it is easy enough to do it yourself. All you need to do is run your computer's SETUP program, write down the drive parameters for your hard drive, and put the information you copied into a text file. Also, record any other setup data that might be difficult to remember. This way, if the CMOS battery should fail, you can replace it, fix the setup information, and be back in business in no time.

You may want to put other favorite utilities on the disk. I always store a text editor on mine so that I can edit the offending CONFIG.SYS and AUTOEXEC.BAT files on my hard disk.

One fast way to create an emergency disk is to run the RESCUE program in The Norton Utilities. After you store everything on the disk, make sure you can boot from it. (That's a step many people forget.) Every time you change your configuration files, make sure you copy them to the emergency disk after testing your changes.

Store the disk safely: Keep it away from heat, telephones and other electrical devices, the family cat, and your coffee cup. I keep mine in a desk drawer. Test it every now and then to make sure you can use it to start up your computer. Someday, when your computer refuses to boot from the hard disk, you'll be very happy to have it.

TIP DOS AND WINDOWS UTILITIES

DOS 6 includes both DOS and Windows versions of antivirus, backup, and undeletion software. The trouble is that your hard disk may not have room for both versions of all three programs. If SETUP tells you that this is the case, go ahead and install one version. After installation is complete, use DoubleSpace (DBLSPACE.EXE) to compress your disk. Then you probably will have plenty of room.

To install the additional program or programs you need, put your SETUP disk in the appropriate drive and type `SETUP /E`. DOS then prompts you through the procedure for installing these files.

—Kay Yarborough Nelson

Memory That's Perfectly Clear

Jasmin Tremblay of Jonquiere, Quebec, asks how to remove memory-resident programs, such as DOSKEY and ANSI.SYS, to free up memory for other applications.

Some memory-resident programs can unload or uninstall themselves, but most can't. This may sound like poor programming, but it really isn't. Memory-resident programs need to attach themselves to the

*Make sure you run DOS 6's
MEMMAKER or an equivalent
program each time you alter your
configuration files.*

operating system in many ways, and often it is impossible to disentangle all of those attachments safely and uninstall a running memory-resident program. Even those with an uninstall command often report that they can't do the job themselves.

The best and safest way to manage such programs is to boot up with them when you want to use them and then reboot without them when you need the extra memory. If you are using DOS 6, its CONFIG.SYS menus, along with the CHOICE command in AUTOEXEC.BAT, make it easy to change from one configuration to another. If you aren't using DOS 6, you can keep separate files and copy the start-up versions you want to C:\CONFIG.SYS and C:\AUTOEXEC.BAT before you reboot. A third alternative is to check out one of the many shareware configuration managers available; a good one is BOOT.SYS (Salzisberg Software and Consulting).

If you can load all of your memory-resident programs into the upper memory blocks (UMBs) using the DEVICEHIGH or LOADHIGH commands, you won't have to reboot as often. Very few DOS applications, if any, use the UMBs. And, with your memory-resident utilities tucked into the UMBs, and with DOS stored in the high memory area (HMA) using the DOS=HMA command in your CONFIG.SYS file, you should have enough room for any DOS application.

Make sure you run DOS 6's MEMMAKER or an equivalent memory-optimization program each time you add a new memory-resident program or significantly alter your configuration files. These programs may find ways to get your memory-resident programs into high memory and leave you with enough conventional DOS memory for your applications. If your memory-resident programs don't fit in the UMBs, you can use the MEM /C/P or MEM /D/P commands to see which

program is eating up the space that your largest applications need.

Support from Every Port

Doug Dreger of Regina, Saskatchewan, reports an unusual problem. He is working with a program that prints information to LPT2 and LPT3 when it is on the office network. But before he can use it when he works on the program at home, he has to rewrite all of the LPT2 and LPT3 references to point to his single printer on LPT1.

Computers running DOS support three parallel printer ports, called LPT1, LPT2, and LPT3. (Normally, the default printer device, PRN, is the same as LPT1; you can change this with the MODE command if you want to use a serial printer.) I don't have room to explain in detail how printer ports work, but they are not particularly complicated. The only real difference between the

three printers is in their addresses.

During bootup, the computer's ROM BIOS senses the presence or absence of each parallel port. It then stores the addresses of each, in the order it finds them, in a table in memory. If the ROM BIOS doesn't locate a particular port, it stores a value of zero in its table position.

Each entry in the table is 2 bytes long. The first entry is stored at 0:408, the next at 0:40A, and the third at 0:40C (all addresses are in hexadecimal). If you want to swap two parallel ports, such as LPT1 and LPT2, you may swap their addresses in the table. If you wish to make one port look like three, as Dreger does, you simply store its address in all three table locations.

The fastest way to fiddle with the addresses is with a short COM program created using DEBUG. But to write or alter such a program, you must be familiar with assembly language. You can do the same using QBasic, and more readers will be able to mold the program to their own wishes. The program listing SWAPPORT.BAS has a sample program you may want to adapt to suit your own needs.

You should be aware, however, that there's some danger in swapping ports. Try not to do it when any supervisory program (such as Windows or DesqView) is running, or when you temporarily exit, or shell, to DOS from an application. Also, if you define the same port as LPT1 and LPT2, for example, make sure your application doesn't try to print to both of them simultaneously. You can imagine the chaos that could result if your program thinks it is printing a chart in landscape mode on one printer and a set of mailing labels on another; if all of the output goes to one physical printer port, it could get jumbled together and create a huge mess.

Pardon Me

Two readers took me to task for an error in last issue's "Reader Forum." A reader had asked why his scripts appeared in DEBUG with a ^J at the beginning of each line. I had answered that he must have pressed Tab as he entered each line in his text editor.

Both John G. Boles of San Jose, Calif., and Michael Hampton of Indianapolis, Ind., pointed out that ^J is a line-feed character, not a tab character. The real mystery then is why the original reader's text editor inserted extra line feeds into the file.

Boles guessed that the reader forgot to save his script file in ASCII format and that the extra line feeds were some kind of control characters his word processor or text editor used. Hampton noted that he has had problems with extra line feeds while using many different editors and has written a short program that removes them from a file.

I'm not completely happy with either explanation. When a file is saved in ASCII format, each line is terminated by both a carriage-return character (ASCII 13, or ^M) and a line feed (ASCII 10, or ^J). This is standard practice in the DOS world. A script file redirected to DEBUG (with a command such as DEBUG -TEST.SCR) should have both characters at the end of each line. The DOS redirector then takes care of smoothing over the differences between keyboard and file input.

Also, the tests that I've run with DEBUG show it can handle extra line feeds without any problem. I added an extra line feed at the end of each line, and DEBUG didn't flinch. Then I added an extra line feed at the beginning of each line. DEBUG still didn't have any difficulties. I removed the carriage returns and left only line feeds. Still, I had no problem. In other words, the error that the first reader reported should never have occurred, even with extra line feeds in the file.

If anyone can duplicate the problem—unintentionally creating a script file that, from DE-

BUG's point of view, starts every line with a ^J—please write to let me know. Tell me which editor and which versions of DOS and DEBUG you used. I suspect that Boles is partly correct and that an untamed editor caused some of the problem. But there may be more to the story than simply an unusual file-storage format. I'll follow up that question with an answer in another issue. ■

Technical Editor Hardin Brothers has been working with and writing about computers for 14 years.

SWAPPORT.BAS is a QBasic program that displays and optionally changes parallel port assignments.

```
DEFINT A-Z

DECLARE FUNCTION PEEKWORD% (ADDR%)
DECLARE SUB POKEWORD (ADDR%, VALUE%)

DEF SEG = 0 'Defines segment to peek and poke

DIM ADDR(1 TO 3), PORT(1 TO 3)
ADDR(1) = &H408 'LPT1 address
ADDR(2) = &H40A 'LPT2 address
ADDR(3) = &H40C 'LPT3 address

'Read and print each LPT port setting:

CLS
PRINT "Original settings:"
FOR I = 1 TO 3
    PORT(I) = PEEKWORD(ADDR(I))
    PRINT "LPT"; MID$(STR$(I), 2); ": ";
    PRINT HEX$(PORT(I))
NEXT I
PRINT

'Set LPT2 and LPT3 to equal LPT1. This
'is the part you can customize for your
'own needs:

POKEWORD ADDR(2), PORT(1)
POKEWORD ADDR(3), PORT(1)

'Let's see the results:
PRINT "New values:"
FOR I = 1 TO 3
    PRINT "LPT"; MID$(STR$(I), 2); ": ";
    PRINT HEX$(PEEKWORD(ADDR(I)))
NEXT I

FUNCTION PEEKWORD (ADDR%)
    W$ = CHR$(PEEK(ADDR%)) + CHR$(PEEK(ADDR% + 1))
    PEEKWORD = CVI(W$)
END FUNCTION

SUB POKEWORD (ADDR%, VALUE%)
    W$ = MKI$(VALUE)
    POKE ADDR%, ASC(MID$(W$, 1, 1))
    POKE ADDR% + 1, ASC(MID$(W$, 2, 1))
END SUB
```

End

G O O K I N O N D O S

Copy Minus The Clobber

by Dan Gookin

MS-DOS 6.2 is out, and it contains some minor but much needed improvements about which I'm quite tickled. Granted, the DoubleSpace and SMARTDrive fixes were needed, given the data losses that some users reported after using those utilities. But some of the more subtle improvements are tremendous and—unfortunately—easy to overlook. Specifically, I'm talking about the one-pass DISKCOPY command, and the anti-clobber features of COPY, XCOPY, and MOVE.

Hallelujah! It's about time.

Kiss Your DISKCOPY Elbow Good-bye

A bane of DOS since the earliest days has been the disk swapping involved in copying data from one disk to another. No one really copies whole floppy disks much anymore. In the olden days though, long before the dawn of the hard drive era, everything was on floppy disks. You made copies often, thanks to the DISKCOPY command.

DISKCOPY is easy to use. To duplicate any disk, stick it in your A drive and type the following:

```
C:\> DISKCOPY A: A:
```

DOS prompts you to insert the original or "source" disk, copies away, then prompts you for the copy or "target." For 360K disks, this was a painless operation. But for larger, high-capacity floppies, DOS would prompt you to swap the disks more than once. For a 1.4MB, 3.5-inch disk, you'd be swapping three or more times. This makes absolutely no sense in a computer with megabytes of memory; why does DOS force you to swap?

Well, finally, after listening to enough grouching,

Microsoft relented and the latest version of DISKCOPY copies any disk in a one-swap action. Ta-da! Of course, as I said before, few people copy whole floppy disks any more, so the point is moot.

The Old COPY Command Clobber Routine

A much more serious DOS fault that's been languishing since the first version appeared is the fact that the COPY command clobbers files without telling you about it. This is truly annoying. For example:

```
C:\> COPY IMPORTNT.DOC A:
```

copies the file IMPORTNT.DOC to drive A. After the file has been copied, you see the "1 file(s) copied" message, meaning everything's OK. Or is it? If a file named IMPORTNT.DOC already existed on drive A, then COPY just overwrote it—nay, clobbered it—without so much as a warning or even a barely perceptible death cry.

This senseless clobbering of files is also a sin of the XCOPY command. DOS 6 later added the MOVE command which—need I say it?—also overwrites existing files without so much as a peep.

The real problem with all this clobbering is that it's mostly irreversible. When the COPY command (or one of its nefarious cousins) zaps a file, overwriting it with one of the same name, you can't use the UNDELETE command to yank it back. No utility in Norton or anything else can recover a file so disgracefully trashed. In fact, the only way to get back a COPY-clobbered file is to try to pull it from a backup disk using the RESTORE command (yet another handy argument for daily, weekly, and monthly backups).

*MS-DOS 6.2's new COPY, XCOPY,
and MOVE warn you before
they delete files.*

The MS-DOS 6.2 Solution

Aside from all the hoopla about the improved DoubleSpace and SMARTDrive utilities, MS-DOS 6.2 improved upon COPY, XCOPY, and MOVE by having them automatically warn you before they clobber anything. For example, if you're copying the file LETTER.DOC and another file with the same name is about to be overwritten, DOS prompts you with the following:

```
Overwrite A:LETTER.DOC (Yes/No/All)?
```

Press N and Enter to skip over that file; it won't be copied (or xcopied or moved). Press Y and Enter to clobber, just as before. Press A and Enter and you get the "All of 'em" option; do that and the COPY command will plow under any additional matching files without prompting you for each of them.

The New, Mysterious /Y switch

MS-DOS 6.2's COPY, XCOPY, and MOVE commands now include a new switch, which goes along with their new clobber/no-clobber abilities. This is the /Y switch, the Y standing for "Yes, clobber them all." For instance:

```
C:\> COPY \WORK A: /Y
```

The /Y at the end of the above command line tells DOS to copy all the files and, yes, overwrite any files on drive A with the same names. There won't be any (Yes/No/All) prompting; COPY works just as it did with older versions of DOS.

Another version of the /Y switch is /-Y. This directs the COPY command to display the (Yes/No/All) prompt whenever a file is about to be overwritten. In DOS-speak, /-Y is the default, which means COPY assumes the /-Y switch unless you specify otherwise.

Using the COPYCMD Environment Variable

Normally there's no need ever to

specify /-Y with COPY, XCOPY, or MOVE, because MS-DOS 6.2 automatically assumes that option (meaning that you always will be prompted before a file is clobbered). However, with the new version of DOS, a new environment variable has been introduced that allows you to preset the new anti-clobber option.

The new COPYCMD environment variable tells DOS how you want COPY, XCOPY, or MOVE to behave when faced with a possible file clobber. Like the DIRCMD environment variable, which specifies some options for the DIR command, the COPYCMD variable can be set to either /Y or /-Y to preset those options for COPY, XCOPY, and MOVE. For example:

TIP THE TIME HAS COME

If you frequently lose track of the passage of time while you're working at your computer, consider adding TIM.BAT to your repertoire of batch files. When you invoke it by typing TIM at the DOS prompt, it neatly displays the date and time at the left edge of your screen.

As written, the program requires enough environment space to accommodate a copy of your current prompt as well as the new prompt displayed by the program's third line.

If you get an "Out of environment space" error message, increase the environment space by adding the following line to your CONFIG.SYS file:

```
SHELL=C:\COMMAND.COM C:\ /P /E:1024
```

This gives you 1,024 bytes of environment space with which to toy. (If your copy of COMMAND.COM resides in a directory other than the root directory, modify the above command accordingly.)

When you type in the program, be sure to include the blank line. It ensures that the prompt is displayed. Naturally, you can insert your own PROMPT message before the time or date is displayed, i.e. "The time is now . . ." The \$T in the first PROMPT command tells DOS to display the time. \$H represents a backspace and is used here to erase the seconds from the display. \$_ ends the current line and displays the next item on the next line. \$D displays the current date.

—David Oatley

TIM.BAT displays the time and date.

```
@ECHO OFF
SET OLDPROMPT=%PROMPT%
PROMPT [your text here] $T$H$H$_[your text here]$D
ECHO ON

@ECHO OFF
PROMPT %OLDPROMPT%
SET OLDPROMPT=
```

End

SET COPYCMD=/Y

The above command sets the COPYCMD variable equal to the /Y switch—the go-ahead-and-clobber option—telling COPY, XCOPY, and MOVE to overwrite files just as would have happened in older versions of DOS. This command will go nicely in your AUTOEXEC.BAT file, but only if you're sure you can live with clobbered files (and no warning, remember).

If the COPYCMD variable is set as above, then you always can override it at the DOS prompt with the /-Y switch. Indeed, this is how the /-Y switch comes into play. Suppose you wanted to ensure that you would be warned before overwriting files. You could deliberately specify /-Y and make it so. In fact, there are other, important times when using the /-Y switch is necessary, such as with batch files.

And Now . . . The Bad News

All this wholesome overwrite file (Yes/No/All) stuff can really make you feel swell about DOS. Alas, there is a drawback: Any time you use the COPY, XCOPY, or MOVE commands in a batch file, DOS assumes the /Y switch and clobbers files once again with reckless abandon. At the DOS prompt, you get the warning. But all of your batch files still work the way they did in the past. This is odd and somewhat disappointing, but there is a fix.

To make the commands in your batch files behave like they do at the command prompt, stick the /-Y

switch onto the end of any COPY, XCOPY, or MOVE commands. This ensures that there will be an overwrite prompt whenever the batch file encounters an already-existing file. It's just a matter of changing this:

```
COPY C:\WORK\*. * A:
```

to this:

```
COPY C:\WORK\*. * A: /-Y
```

The /-Y means DOS will always prompt. (There's no need to insert the /Y in any batch file because that's the way DOS behaves automatically.)

And Finally, Some Good News for Everyone Else

If you're stuck in the past or reluctant to upgrade to MS-DOS 6.2, then there is a solution at hand. It's the old batch-file solution, the if-exist test, which allows files to be checked prior to clobbering. Alas, this is a klutzy way to do things, and not always accurate, but it does give you a bit of anti-clobber protection.

The program listing is a batch file called CP.BAT. It's a replacement for the COPY command that tries to figure out if any files will be clobbered. The batch file requires a complete destination path and filename, and it tests for files already on disk with two if-exist tests (actually if-not-exist). The if-exist test checks to see if files with the same name exist and, if so, CP.BAT displays a warning and stops copying.

Use your text editor to enter the listing for CP.BAT. Save it to disk as CP.BAT in your UTIL or BIN directory, or some other directory on the path. That way you can use CP.BAT instead of COPY to ensure that files aren't being clobbered.

Be careful with this program! The CP.BAT file successfully copies files, but there are a few situations where it can be fooled and may end up clobbering a file already on disk. (It's possible to make the batch file check for these conditions, but that makes it very long and extremely slow.)

You can make CP.BAT into a MOVE batch file by adding a line before the final GOTO END statements:

```
ECHO Files copied
DEL %1
GOTO END
:WARNING
```

The DEL %1 command deletes the originals, which makes the batch file a MOVE command instead of COPY. Name the file MV.BAT and use it as your anti-clobber, file-moving batch file if you like. ■

CP.BAT is a COPY alternative that gives older DOS versions some of the file-overwrite protection available in DOS 6.2.

```
@ECHO OFF
REM COPY FILES FROM %1 TO %2
REM Test parameters
IF %1NOTHING==NOTHING GOTO WARNING
IF %2NOTHING==NOTHING GOTO WARNING
REM Test for existence of duplicate files
IF NOT EXIST %2 GOTO CP01
ECHO %2 already exists!
GOTO END
:CP01
REM Test for subdirectory\file(s)
IF NOT EXIST %2\%1 GOTO CP02
ECHO %2\%1 already exists!
GOTO END
:CP02
ECHO Copying File(s)...
COPY %1 %2 >NUL
ECHO Files copied
GOTO END
:WARNING
ECHO You must specify a source and destination
ECHO filename with CP
:END
```

End

Contributing Editor Dan Gookin is the author of numerous books on computing, including the best-selling DOS for Dummies (IDG Books).

UPGRADING TO PC DOS

Variations on an MS-DOS Theme

From a distance, PC DOS 6.1 looks and acts like MS-DOS 6, but in a feature-for-feature comparison, you'll find important differences.

by Robert L. Hummel

PC operating systems are getting interesting. Perhaps not by the standards of ancient China, where hurling the imprecation, "May you live in interesting times," was tantamount to inviting famine, pestilence, and flood, but certainly interesting enough by the standards of computing history.

For over a decade, Microsoft's MS-DOS has been the market's dominant operating system. During that time, Microsoft and computer maker IBM have worked under a joint development agreement. Under its terms, Microsoft shared the code for MS-DOS with IBM, which, in turn, marketed a customized version of MS-DOS called PC DOS. Now that their agreement has expired, however, Microsoft and IBM are battling ruthlessly for the hearts and minds of DOS users. It won't be a two-way fight

for long. At this moment, Novell is poised to offer its revamped version of DR DOS, Novell DOS 7, as a third DOS alternative.

The changes afoot may well loosen Microsoft's grip on market share, but, as always, increased competition raises a host of issues. How do the products differ? Is compatibility with existing software a problem? And, of course: Should you change brands or stick with what you've got?

In my experience, the capabilities of MS-DOS 6 and PC DOS 6.1 are so similar that choosing between the two comes down to deciding which suite of utilities suits you better, whether you need lots of documentation, and what kind of installation process you prefer. Because Novell DOS 7 still is under development as of this writing, it's difficult to analyze it in any depth, although the sidebar "Novell DOS 7: Also-Ran or Dark Horse?" offers a few general impressions on the operating system.

From Box to PC

At first glance, the most obvious difference between the latest MS-

DOS and PC DOS upgrades is their version numbers. The PC DOS package lists the program as version 6.1—mainly, it seems, to distinguish it from Microsoft's product. Throughout the IBM documentation, references to the software appear variously as version 6 or version 6.1, and internally PC DOS identifies itself to applications as version 6.00, just as MS-DOS does. Programs from MS-DOS 6, such as QBasic, run under PC DOS 6.1, and vice versa. Unfortunately, the confusing numbering is likely to continue, because Microsoft recently announced its intention to release a "maintenance revision," which it has dubbed MS-DOS 6.2.

The difference in the two operating systems' documentation is more substantial. One of the major complaints about MS-DOS 6 is its scant manual: a 320-page user's guide. Although the guide is easy to read, it lacks even the most elementary of command references. Microsoft claims that it took this approach in response to users' complaints that the documentation supplied with previous DOS ver-

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sions was too voluminous to be approachable.

IBM must think that its users are more cerebral, because PC DOS 6.1 comes with four manuals totaling nearly 1,000 pages. Included are a well-written *User's Guide*, a comprehensive volume called *Command Reference and Error Messages*, and a separate *Installation Guide*. For beginners, IBM also throws in a copy of *Everyday DOS* (Que Corporation), which offers a very basic introduction to computers and the workings of DOS.

Both MS-DOS 6 and PC DOS 6.1 provide easy-to-use, full-screen, menu-driven installation programs. But although the programs are similar, they're not identical. Their setup programs offer different default settings, and you must read their screens carefully to ensure that you install the features you need.

MS-DOS's short and sweet setup program performs a complete installation by default, including Windows utilities. In the process, it occupies 5.9MB of space on your hard drive, but you may opt not to install six bulky utilities: the DOS and Windows versions of ANTI-VIRUS, BACKUP, and UNDELETE.

But as good as it is, MS-DOS 6's SETUP isn't completely automatic. None of the optional DOS utilities are activated by SETUP. You must add a line to your CONFIG.SYS or AUTOEXEC.BAT file to set the programs to work.

PC DOS 6.1, on the other hand, installs only its DOSSHELL program by default. To install backup or antivirus support, you must change the selections on SETUP's screen. If you opt to install all of the program's options, including PCMCIA and PenDOS support, you need 8.3MB of hard disk space. This doesn't include the disk-compres-

sion software that is yet to be released.

These aren't the only ways in which the two setup programs differ. Unlike MS-DOS, PC DOS arranges for automatic start-up of any programs that you designate for installation, placing the appropriate commands in your CONFIG.SYS or AUTOEXEC.BAT file. PC DOS also supports partial installation; when you select this option, SETUP installs only new components of the operating system.

Finally, IBM assumes that once you upgrade to PC DOS 6.1, you'll stick with it. Its setup program doesn't save your old version of DOS unless you select the appropriate option in the setup screen. The MS-DOS upgrade, in contrast, saves your old version of DOS in a separate directory before proceeding with installation—a worthwhile precaution. If you hold onto the old DOS and your programs en-

NOVELL DOS 7: ALSO-RAN OR DARK HORSE?

During a typical discussion about DOS, any mention of Digital Research's DR DOS is usually a disparaging one—unless you're talking to a DR DOS convert. The reason for this is simple economics: Compared to PC DOS and MS-DOS, DR DOS commands a small percentage of the total market. This fact, coupled with general neglect by the computer press, has prompted most users to assume that DR DOS is not a serious alternative to MS-DOS.

Recently, however, Novell acquired the rights to DR DOS and announced that a new version of the product, to be called Novell DOS 7, was under development. Because Novell generally is considered the dominant force in networking software around the world, this announcement is noteworthy. With a huge number of PCs already running Novell's network software, Novell DOS likely will find a ready market.

Of course, Novell DOS must retain compatibility with MS-DOS and PC DOS, but Novell plans a few improvements that may woo users of the other DOS brands into switching to Novell DOS. Two of the most interesting improvements are built-in multitasking and networking capability.

Unlike the DOS shell provided with the Microsoft and IBM operating systems, Novell DOS 7 will permit true multitasking of DOS applications—the running of several applications simultaneously on 386 and 486 PCs. At present, MS- and PC DOS accommodate only task switching—loading multiple tasks and switching among them. When a task is switched to

the foreground, all other tasks—those in the background—are frozen. In a multitasking system, however, applications that aren't in the foreground continue to execute in the background, which lets you, for example, use your PC to update your spreadsheet while you back up your hard disk.

Networking usually is associated with large computer installations, but DOS 6's InterLink program, which also is included in PC DOS, offers a limited type of networking. Microsoft had planned to include its Workgroup Connection networking software in MS-DOS 6, but removed it from the package at the last minute.

Novell DOS 7, on the other hand, offers full-fledged support for server-based or peer-to-peer networks. Because high-speed network adapters cost as little as \$60 each, the inclusion of this capability makes installing a two-PC, peer-to-peer network cheaper than buying a second printer, modem, or CD-ROM drive. A network setup also means that users can share applications and data files, which will eliminate duplication and thus save hard disk space.

At press time, Novell DOS 7 is still in beta development (the scheduled release date is mid-November 1993), but first looks at the system are promising. Given the marketing and development skills of Novell, it's certain that IBM and Microsoft are in for some stiff competition. And PC users ultimately will benefit.

—R.L.H.

counter significant conflicts with the new DOS, you can uninstall the upgrade in one step.

The Utilities

Simple setup procedures are nice, but what really distinguishes the latest DOS upgrades from their predecessors are the utilities that are bundled with them.

With version 6, Microsoft lightened MS-DOS's load by abandoning more than a dozen utilities that it felt had outlived their usefulness, among them EDLIN.EXE, EXE2BIN.EXE, ASSIGN.COM, and JOIN.EXE. IBM didn't follow suit, but confusion over the licensing arrangement for Basic, BasicA, and QBasic did force it to remove all traces of Basic from PC DOS 6.1 (see the sidebar "Whither Basic"). Also among the missing is the full-screen editor EDIT.COM, a program that relies on QBasic.

Overall, however, both MS- and PC DOS have grown rather than shrunk. By licensing the technology of leading independent software vendors, Microsoft found an easy way to add a wide range of capabilities to DOS 6's lineup. PC DOS 6.1's later shipping date seems to have given IBM the opportunity to assess the strengths and weaknesses of MS-DOS 6's bundle and go Microsoft one better. In general, the utilities in PC DOS 6.1 are more robust, supporting a wider range of options than those in MS-DOS 6.

As you might expect, IBM and Microsoft tapped different vendors to supply their utilities, but both upgrades offer essentially equivalent programs. These are the highlights:

Memory Managers. Memory management for 386 and 486 systems received a lot of attention in MS- and PC DOS 5, but only the truly persistent were able to take full advantage of this new feature. Fortunately, both MS-DOS 6 and PC DOS 6.1 make memory man-

agement more accessible. Rather than force you to calculate each program's memory usage manually and then juggle the loading order to squeeze the most programs into the least amount of memory, both DOSes automate the process.

Microsoft's contribution is MemMaker, a program designed by the company's own development team. MemMaker first searches upper memory for unused areas in which it can create upper memory blocks (UMBs). It then reboots your system, monitors your programs as they load, and examines every possible load order until it finds the one that leaves the most free conventional memory. This configuration then is written to your CONFIG.SYS and AUTOEXEC.BAT files. If you later make changes to your system, adding or removing memory-resident programs and device drivers or changing your cache size, for example, you must run MemMaker again.

IBM based PC DOS 6.1's memory optimization strategy on Central

Point Software Inc.'s RAMBoost. In principle, RAMBoost performs the same steps as MemMaker and should achieve similar results. On my system (an 80386 with 8MB of RAM and VGA video), RAMBoost proved slightly more aggressive, creating 13K more upper memory than MemMaker and leaving 3K more conventional memory free. But, to my mind, RAMBoost's biggest advantage is its ability to monitor your CONFIG.SYS and AUTOEXEC.BAT files, detect changes, and automatically re-optimize memory usage.

Backup Programs. If any one DOS program can be accused of spawning an industry, it's Backup. It was finicky, inflexible, and its file formats changed from version to version. On top of that, its companion program, Restore, had the disturbing habit of refusing to read disks created by Backup. Things are better these days.

MS-DOS includes MSBackup (as well as the Windows utility, MW-

WHITHER BASIC?

Purchasers of PC DOS 6.1 may be surprised to find that it lacks any form of Basic. Gone is not only Microsoft's QBasic program, present in PC DOS 5, but also the traditional Basic and BasicA programs that work with ROM Basic, the very rudimentary version of Basic formerly built into IBM computers. MS-DOS 6, of course, continues to include QBasic.

For the past decade, the inclusion of Basic in the PC DOS package has helped launch the career of amateur and professional programmers alike. If you plan to switch to PC DOS 6.1, be sure to retain whatever variety of Basic you have in your current DOS version.

—R.L.H.

TIP MOVE IT ON OVER

You probably know that DOS 6's new MOVE command lets you relocate a file or group of files in one step. But did you know that it also lets you rename directories? The syntax is easy to remember, too:

```
MOVE C:\oldname C:\newname
```

—Kay Yarborough Nelson

DON'T WORRY, BE COMPATIBLE

IBM wants DOS to look like OS/2, Microsoft wants DOS to look like Windows, and Novell wants DOS to look like NetWare. Together, it seems that the three have the power to fragment the solidarity of DOS users and create havoc. Fortunately, another force is at work: a huge installed base. The combined influence of users running DOS and DOS applications on more than 110 million PCs is more powerful than that of the three vendors combined.

For better or worse, a critical litmus test for any PC operating system is its ability to run existing DOS applications. So important is this capability that OS/2 2.1 and Windows/NT, the latest 32-bit multitasking operating systems, are forced to provide complete compatibility with DOS. IBM even goes so far as to bill its OS/2 as "a better DOS than DOS."

If other operating systems must provide DOS compatibility, it makes sense that DOS itself will be held to the same standard. Compatibility with the installed base of applications is a mandatory specification for any new DOS version for one simple reason: A new operating system that doesn't run existing DOS applications is, by definition, not DOS. In short, you can buy your next DOS upgrade from any vendor and take compatibility for granted.

But this doesn't mean that DOS won't change in other ways. It's easy to fall into the trap of thinking of DOS as a single object. In reality, DOS is a collection of about 100 separate programs and nearly again as many data files. In general, these programs and files can be classified into three general groups: utilities, command interpreters, and the kernel.

The first and largest part of DOS comprises the so-called external DOS commands. These commands, such as CHKDSK and XCOPY, are really just separate utility programs that are bundled with DOS. Over the years, utilities had been added when required, and, recently, a raft of obsolete files were removed. In past DOS versions, the new utilities were often quick and dirty, providing minimal capabilities. Recent versions of DOS, however, provide more sophisticated utilities—to organize your files, recover deleted files, and back up your hard disk. These utilities are chosen specifically by

each DOS vendor and can vary among brands.

The section of DOS with which users interact—the interface—is established by the second part of DOS, called the command interpreter, or shell. The default command interpreter, COMMAND.COM, is simply a program that displays the familiar C:\> prompt, reads commands from your keyboard, and translates those commands into actions.

COMMAND.COM isn't sacred, however. You can replace it with a different command interpreter, such as the DOSSHELL program, to give DOS a completely different appearance. Windows, in fact, is simply a replacement shell for DOS, and IBM's future DOS will sport a user interface that's modeled after the OS/2 Workplace shell.

The DOS kernel, although never seen directly by the user, is the third and most important part of DOS. The kernel contains the DOS application program interface (API). To your applications, the DOS API looks like a library of specialized commands. The programs use these commands to perform their low-level activities, such as reading from and writing to the disk, displaying characters on your screen, reading characters from the keyboard, and sending text to the printer.

Since it introduced MS-DOS 1.1, Microsoft has gone out of its way to ensure that each new version of the operating system is upwardly compatible with previous versions. As a result, you can write an application that runs identically under all DOS versions from 1.0 to 6.1. Because the DOS kernel forms an integral part of every DOS application, other DOS vendors must honor this tradition of compatibility if your applications are to continue to execute properly.

The cornerstone of DOS's continued popularity has been—and will continue to be—the consistency of the DOS kernel across revisions. With the three giants—IBM, Microsoft, and Novell—squaring off, it's clear that the DOS wars have just begun. It's just as clear that compatibility won't be a casualty. The huge installed base of DOS applications ensures that DOS will remain a stable platform; future versions of DOS will run your current programs.

—R.L.H.

Backup), a licensed version of Symantec's The Norton Backup. A menu-driven program, MSBackup eases the burden of backing up your hard disk to floppies. The program demonstrated some quirks during testing, however. When you install the program, it tests itself. But regardless of how many times I executed the configuration procedure, the program refused to recognize the floppy disks that it had created as part of the test.

For its backup program, IBM licensed CPBACKUP from Central Point Software. When it comes to capabilities, CPBACKUP dwarfs its MS-DOS counterpart. Not only does it back up your disk to floppies, but it also lets you write backups to tape drives or network drives. And CPBACKUP is more flexible than MSBackup, providing a choice of user interfaces (beginner, intermediate, or advanced), data encryption levels, and storage

formats. In addition, you may choose from a variety of compression techniques, minimizing compression time while increasing storage space or vice versa.

Disk Compressors. Prior to the introduction of MS-DOS 6, disk compression was embraced by only a small percentage of DOS users. When Microsoft included its proprietary disk-compression system, DoubleSpace, in MS-DOS 6, it cre-

ated widespread acceptance for the technique. Microsoft based its disk compression on technology licensed from Vertisoft Systems Inc., makers of the DoubleDisk compression utility. But even though DoubleSpace is well integrated into DOS's file system, it has limitations.

Its most obvious problem is its inability to decompress a disk, something sure to be addressed in MS-DOS 6.2. At present, if DoubleSpace proves incompatible with one of your applications, you must back up all your data, reformat your disk, and restore all your files. The new Backup makes this a little easier, but, let's face it, few people enjoy backing up a hard disk. DoubleSpace is hampered further by the fact that although it can compress floppy disks, another DOS system can read those disks only if it, too, is running MS-DOS 6 and has DoubleSpace installed.

IBM tested the disk-compression waters by bundling Stac Electronics' Stacker with PC DOS 5. In PC DOS 6.1, IBM chose to integrate AddStor Inc.'s SuperStor/DS disk-compression program instead. (At press time, however, this integration was not complete. Copies of PC DOS shipped before September 30, 1993, the anticipated release date, included a postcard that customers could mail to IBM to request the program.) According to preliminary information, the SuperStor/DS system is a DoubleSpace work-alike. DoubleSpace and SuperStor/DS use compatible

formats, and both programs can read disks created by the other.

Additional features, lacking in DoubleSpace but provided in SuperStor/DS, include password protection and the ability to decompress a disk. Another PC DOS plus, is IBM's Universal Data Exchange (UDE), a memory-resident program that lets you store compressed data on disks and read those disks on other PCs, regardless of what DOS version that PC is running and whether or not the machine is equipped with disk-compression software.

Final Considerations

PC DOS has a bit of an upper hand in one further area: support for emerging hardware. Looking toward the future, IBM made its new DOS compatible with its own PenDOS, an interface that permits you to substitute a pen-like input device for a mouse, as well as with PCMCIA peripherals, thin credit card-size modules that house network cards, memory expanders, or external drives. For laptop or notebook users, these capabilities may tip the scales in favor of PC DOS 6.1.

But maybe not. If you're interested in Basic programming, the greater flexibility offered by a few PC DOS utilities may well be overshadowed by the fact that the oper-

PRODUCT INFORMATION

MS-DOS 6, \$129.95

Microsoft Corp.
1 Microsoft Way
Redmond, WA 98052
800-426-9400

Novell DOS 7, price pending

Novell Inc.
122 East 1700 S.
Provo, UT 84606
800-453-1267

PC DOS 6.1, \$109

IBM Corp.
1133 Westchester Ave.
White Plains, NY 10604
800-342-6672

ating system fails to include QBasic, as MS-DOS does.

Still, overall, MS-DOS 6 and PC DOS 6.1 are more similar than they are different, and you may expect them to be equally adept at running older DOS software (see the sidebar "Don't Worry, Be Compatible"). The two packages are competitively priced, too. PC DOS's introductory \$79 upgrade offer was scheduled to increase to \$109 in late October 1993, but if pricing for MS-DOS 6 is any guide, retailers are likely to offer it at a significant discount for months to come. The official cost of the MS-DOS 6 upgrade was set at \$129.95 when Microsoft's introductory offer expired, but many suppliers continue to charge around \$50 for the product.

In time, perhaps the two operating systems will grow more distinct, and one product will demonstrate clear superiority over the other. But, for now, neither has an overwhelming edge. That being the case, your best course of action is to evaluate DOS as you would word processing software: Choose the package whose setup features, documentation, and utilities suit you best. ■

TIP EXTRA SENTRY DUTY

If you leave your computer running day and night, and you're using UNDELETE's Delete Sentry protection scheme in DOS 6, your \SENTRY directory may run out of space in which to store deleted files. This happens because the sentry checks the system date only when your computer starts. If the date doesn't change, files aren't purged, and the directory fills up.

The simplest solution is to turn your computer off every so often, but you also may purge \SENTRY manually by typing UNDELETE /PURGE drive.

—Kay Yarborough Nelson

THE POWER OF DOSKEY

10 Reasons to Load DOSKEY

Here's how to create macros, redefine DOS commands, correct command-line typos, and seven more reasons to use DOSKEY.

by Ken Johnson

One of MS-DOS's most exciting features is DOSKEY, a program that allows you to recall and edit commands at the command line. Because this often-requested feature was not available until the introduction of MS-DOS 5, many users have been employing third-party programs to do the job.

I've found ten significant reasons to use DOSKEY; however the most important is DOSKEY's macro feature, which lets you create your own customized DOS commands. These commands execute much faster than they would if they were written into a batch file, and you can assign these multiple commands to a single key. You even can give macros the same names as internal DOS commands, something you aren't able to do with batch files.

Ken Johnson is training and support manager at the law firm of Mayer, Brown & Platt in Chicago. He writes often about computers for PC user's groups and legal computing periodicals and is Contributing Editor of Hard-Copy, the journal of the Chicago Computer Society.

How to Create Your Own Macro Commands

Before you create any macros, you must load DOSKEY. You can do this at the command line by typing DOSKEY, or you can put DOSKEY in your AUTOEXEC.BAT file. DOSKEY then will execute automatically when you turn on your computer.

The syntax for creating a DOSKEY macro is as follows:

```
DOSKEY macroname=[commands]
```

Macroname is the name you choose for the macro; *commands* are the DOS commands you want to execute when you enter the macro name at the DOS prompt. If you enter "macroname=" by itself (with nothing following the equal sign), you delete the macro. (For more on syntax, see the side-

bar "DOSKEY Command Syntax.")

To demonstrate DOSKEY's macro-making ability, I'll be using three macros that I created and use regularly:

- FF is a file finder that searches

for a filename that you specify.

- BYDATE sorts all files in a directory by date in descending order.
- DKOPY lets you copy a disk to another disk of a different size and density.

To create the macros FF, BYDATE, and DKOPY, enter the following commands at the DOS prompt:

```
DOSKEY FF=DIR \ $1 /S /B
DOSKEY BYDATE=DIR $* /O-D
DOSKEY DKOPY=ATTRIB -H $1\*. *
/S $T XCOPY $1 $2 /S /E
```

DOSKEY examines everything you enter on the command line for a macro. When you enter one of the macro names, DOSKEY intercepts it, translates the macro into its DOS commands, and reenters those commands for COM-

MAND.COM just as if you had typed them directly.

DOSKEY macros use several special symbols, which are easy to recognize because they contain the dollar sign. You can place up to nine parameters (\$1 through \$9) in a

1

Create Your Own Commands

macro command (much like %1-%9 in batch files). The first command you type after the equal sign is assigned to \$1, the second to \$2, and so on. You also can use the special symbol \$* to refer to all parameters—everything you've typed after the macro name.

A DOSKEY macro can contain multiple DOS commands and can redirect DOS input and output. In a multiple command macro, the individual commands are separated by the \$T symbol. In redirecting output, \$G represents the greater than sign (>), \$L the less than sign (<), and \$B the pipe operator (|).

Unfortunately, DOSKEY can't save macros automatically. Because macros are in RAM, you lose them when you turn off the computer. For more information on saving your macros, see the sidebar "Saving DOSKEY Macros for Reuse."

To use FF, type FF *filename*, replacing *filename* with the file for which to search. The filename is plugged into the variable \$1. For example, to find a file called REPORT.TXT, you'd type the following:

```
FF REPORT.TXT
```

DOS will execute this command:

```
DIR \REPORT.TXT /S /B
```

The macro uses the DIR command to search from the root directory of the current drive, including all subdirectories (the /S switch). It displays found files with full path and filename but without size and date details (the /B switch).

You can test BYDATE by entering the following:

```
BYDATE *.* /A-D
```

this command translates as:

```
DIR *.* /A-D /O-D
```

This lets you see all files (/A) but excludes directories (-D). The \$* symbol we included in the macro lets you give not only file specifications but also additional DIR switches, all of which will be passed to the command.

You use DKOPY by entering DKOPY with the source drive (\$1) and the destination drive (\$2). The macro first uses the ATTRIB command to unhide any files on the first drive so that they can be copied. Then XCOPY copies all files on the first drive to the second, including subdirectories (/S) and empty subdirectories (/E). Notice that the two individual commands in this macro are separated with \$T.

How to Redefine DOS's Own Commands

Because DOSKEY intercepts command-line keystrokes looking for macros, DOS executes DOSKEY's commands before its internal commands, executable programs, or batch files.

In other words, DOSKEY changes DOS's traditional hierarchy of execution. When you enter something on the command line, DOS usually looks for internal commands (such as DIR, COPY, and DEL) first, then EXE files, COM files, and BAT files, in that order. This is why you can't create a batch file called DIR.BAT and execute it by entering DIR on the command line; DOS always will execute its own internal directory command before a batch file of the same name (see the sidebar "DOSKEY

Macros Versus Batch Files"). On the other hand, you can create a DOSKEY macro called DIR that will execute before the internal command. This effectively allows you to redefine any DOS command to do what you want.

For example, are you tired of watching output scroll off the top of your screen after using the TYPE command? When you TYPE a file to the screen, this macro will pipe (\$B) the output into the MORE filter, which will pause the display when the screen fills:

```
DOSKEY TYPE=TYPE $1 $B MORE
```

Any command or program that scrolls output can be redefined the same way.

You also can redefine DOS commands for security. Let's say, for example, that you use a third-party formatting program called PCFORMAT. You could redefine the FORMAT command to execute the PCFORMAT program like so:

```
DOSKEY FORMAT=PCFORMAT $*
```

Now anyone trying to format a disk on your PC automatically will run the safe format program, provided PCFORMAT or its directory is on your PATH. The \$* ensures that any information entered with the FORMAT command (such as the disk to format) is passed to the PCFORMAT program.

For even more security, you could redefine the FORMAT command to do nothing. Use this macro:

```
DOSKEY FORMAT=FORMAT[Alt-255] $*
```

Here Alt-255 represents the ASCII null character, which does not display (it looks like a space). You enter it by holding down the ALT key and pressing 255 on the

2 Redefine DOS's Commands

4 Redefine the Keyboard

3 Create Default Switches

numeric keypad. Now when someone enters the **FORMAT** command, DOSKEY will translate it to **FORMAT+NULL**, which is not a legitimate command or program name. Thus, DOS will return a "Bad command or file name" error message.

If you have a DOSKEY macro with the same name as a DOS command, but want the DOS command to execute as normal, enter a space before the command on the command line. DOSKEY matches the exact macro name—a leading space is not a match. So in the above example, someone could enter **FORMAT A:** with a leading space to format the disk in the A: drive; DOSKEY won't recognize "[space]FORMAT" as one of its macros.

Creating Default Switches for DOS Commands

Redefining DOS commands means that you also can set certain default switches for convenience or safety. For example, have you ever gotten

into trouble with the **DEL** and **ERASE** commands? Starting with DOS 5, **DEL** and **ERASE** include the **/P** switch to prompt you for confirmation before each file is deleted. To give yourself a safety net, create the following two DOSKEY macros:

```
DOSKEY DEL=DEL $1 /P
DOSKEY ERASE=ERASE $1 /P
```

Now whenever you enter the **DEL** or **ERASE** commands, you'll get the **/P** switch automatically.

If you are a laptop user, you can use DOSKEY to set up your programs so they run in monochrome. For example:

```
DOSKEY EDIT=EDIT $1 /B /NOHI
DOSKEY SHELL=DOSSHELL /B
```

The **EDIT** macro will execute the DOS **EDIT** program in monochrome, no high intensity, and optionally

pass a file for loading. The **SHELL** macro will load the **DOSSHELL** program, again in monochrome.

How to Redefine the Keyboard

For more advanced users, DOSKEY lets you have fun with the keyboard. Macro names don't have the same limitations as DOS filenames, so you can include the following "illegal" characters in macro names:

* ? + . / \ : ; []

Macros also can have some Ctrl-letter names, including:

^A ^B ^D ^E ^G ^K
^L ^N ^O ^Q ^R ^U
^V ^W ^X ^Y ^Z

Consider these DOS-

KEY macros:

```
DOSKEY ^E=DIR /OE /P
DOSKEY ^K=CHKDSK
DOSKEY .=CD ..
DOSKEY \=CD \
```

Now you can press Ctrl-E and Enter to list a directory sorted by

5

Edit the Command Line

6

Recall Commands

DOSKEY COMMAND SYNTAX

DOSKEY [BUFSIZE=size] [/INSERT or /OVERSTRIKE] [/REINSTALL] [/MACROS] [/HISTORY] [macroname=[commands]]

/BUFSIZE=size specifies the size of the DOSKEY buffer where macros and the command stack are stored. The default size is 512 bytes, with a minimum of 256 bytes. If the buffer fills, the oldest commands are deleted from the command stack. To save more commands and to allow space for additional macros, increase the buffer to 1024 or 2048 bytes.

/INSERT or **/OVERSTRIKE** selects the default editing mode for the command line. The default is Overstrike. You can change to and from Insert and Overstrike easily by pressing the Insert key, but whenever you press Enter, DOSKEY returns to the default editing mode.

/REINSTALL installs a new copy of DOSKEY. This allows you, for example, to change the buffer size without rebooting. However, the old copy of DOSKEY stays in memory, occupy-

ing about 4K of RAM that won't be available for other programs.

/MACROS (or **/M**) displays the currently defined macros. You can employ this switch to save your macros in a text file for use the next time you boot up your computer.

/HISTORY (or **/H**) displays all commands in the command stack. (This is similar to pressing F7, but without line numbers.)

macroname=[commands] creates a DOSKEY macro. "Macroname" is the name of the macro; "commands" are the DOS commands you want to execute when you enter the macro name at the DOS prompt. If you enter "macroname=" by itself, that macro is deleted from the buffer.

On 386 and 486 computers, you can install DOSKEY into upper memory with the **LOADHIGH** command. If you have some upper memory to spare, increase DOSKEY's buffer size to give DOSKEY room to record more commands and macros.

—K.J.

extension, or Ctrl-K and Enter to run CHKDSK. Typing a period plus Enter will move you to the parent directory, and a backslash (\) plus Enter will move you to the root directory. Notice that because these are macros you do have to press Enter to execute the commands.

Smart Editing at the Command Line

DOSKEY finally brings some intelligent editing to the DOS command line. With DOSKEY, cursor movement keys are nondestructive, meaning that they don't erase characters as the cursor moves. You can use the arrow keys to move the cursor easily and then add, delete, or change text (see the sidebar "DOSKEY Keys and Commands").

Besides the left and right arrow keys, DOSKEY lets you use Ctrl-left arrow to move the cursor one word to the left and Ctrl-right arrow to move one word to the right. The Home key moves the cursor to the beginning of the line and the End key to the end. The backspace key deletes the character to the left of the cursor, Ctrl-Home deletes from the cursor to the beginning of the line, and Ctrl-End deletes to the end of the line. The Escape key clears the command line. And it doesn't matter where the cursor is on the line when you press Enter.

The Insert key toggles between insert and overstrike modes. The default mode is overstrike, and the cursor will enlarge to a small block when you press the Insert key. You can make Insert the default editing mode by starting DOSKEY with the /INSERT switch.

Command Line Recall

One of the most useful features of DOSKEY for everyday use is command line recall. DOSKEY stores the commands you issue from the DOS prompt in order in a memory buffer called the command stack. You can then recall these



Search for Commands

commands in order, pick out a specific command by number, or recall a command that matches the text you have entered (Smart Search). And, of course, you can edit the commands once they've been returned to the command line.

Before DOSKEY, command recall was limited to using the function keys F1 through F5. Using these function keys was crude, because they simply copied characters from one previous command (an invisible "template") to the command line. DOSKEY provides easy access to many previous commands

(though the F1 through F5 keys still perform their old functions, even with DOSKEY loaded).



Stack Multiple Commands On One Line

The up arrow redisplay the last command you've entered (that is, the most recent command in the command stack). Continuing to press the up arrow will scroll backwards through the command stack. Similarly, the down arrow will cycle forward through the stack. When you find the command you want to reexecute, simply press Enter or edit it. If you decide you don't want any of the previous commands, press Escape to clear the command line. (Without DOSKEY, the Escape key aborts the current com-

SAVING DOSKEY MACROS FOR REUSE

Fortunately you can write macros to a batch file, edit the file, then execute that batch file each time you turn on your machine. Follow these steps:

1. Use DOSKEY's /M switch and the redirection operator (>) to write out the macros to a file with the BAT batch-file extension:

```
DOSKEY /M > C:\DOS\DKMACROS.BAT
```

2. Use an ASCII text editor (such as DOS's Edit program) to edit the file, placing the word DOSKEY in front of each macro definition. You also might want to place an @ECHO OFF at the beginning of the file to prevent the commands from displaying as the batch file executes. In addition, it is a good idea to include remark statements to remind yourself exactly what the macros are doing.

You also will need to edit your macros if any use % variables in FOR loops. The DOS command line uses %*variable* with the FOR command, but batch files must use %%*variable* for the same command. For example, you might have the following macro to delete multiple files that don't share a common name:

```
MDEL=FOR %F IN (*) DO DEL %F /P
```

In the batch file you would create this macro as:

```
DOSKEY MDEL=FOR %%F IN (*) DO DEL %%F /P
```

3. Change your AUTOEXEC.BAT file to call the macro definition file after you have installed DOSKEY. The line would read:

```
CALL C:\DOS\DKMACROS
```

Now your macros will be loaded each time you boot up. New macros can be defined easily by adding them to the DKMACROS.BAT file.

—K.J.

DOSKEY MACROS VERSUS BATCH FILES

Much of what you can do with DOSKEY macros also can be done with batch files. DOSKEY macros have both advantages and drawbacks.

On the plus side, DOSKEY macros have execution priority over batch files, DOS commands, and programs with the same name. Macros can redefine DOS commands; batch files cannot.

You can execute macros from any drive and directory because they are defined in RAM. To execute a batch file, it must be in the current directory or in a directory included in your path.

DOSKEY macros run much faster than batch files because they execute from memory; batch files require a disk access to read the file.

Macros take much less disk space than batch files. Even a small batch file requires at least one disk cluster (usually 2K to 4K). Many batch files can take a good deal of space on your hard disk. By contrast, a single macro definition file can contain hundreds of DOSKEY macros.

The batch-file language has no equivalent of DOSKEY's \$* symbol, which represents everything entered on the command line with the macro name.

On the other hand, macros are limited to 127 characters, the limit of the DOS command line. There is no restriction on the size of a batch file.

DOSKEY macros cannot access and use DOS environmental variables as batch files can.

Batch files are more versatile because they allow for conditional branching; there are no GOTOs in DOSKEY macros.

Macros can't call other macros; batch files can be nested with the CALL batch command.

Because DOSKEY translates the macro for COMMAND.COM, the macro's commands always are displayed. In batch files you can prevent commands from displaying by using ECHO OFF or the @ symbol before a command.

—K.J.

The number of commands that can be saved in the stack depends on the length of the commands, the number and length of DOSKEY command macros defined, and DOSKEY's buffer size. The default buffer size is 512 bytes, but you can increase this by using the /BUFSIZE= switch when loading DOSKEY. You can't delete a specific command from the command stack, but you can delete all commands from the stack by pressing Alt-F7. This has interesting implications for recording commands for batch files, as we'll see below.

Smart-Search Command Recall

Finding previous commands in the command stack is easy with DOSKEY's F8 key, which does a smart search. Type some text on the command line and press F8. DOSKEY will search backwards in the command stack for the first command that starts with the text you've entered and displays it on the command line. If it's not the command you want, you can cycle through other matches (most recent to oldest) by continuing to press F8.

For example, suppose that you need to reexecute a complicated XCOPY command you did a few minutes ago. With DOSKEY you could type X on the command line and press F8. DOSKEY will search

the stack and display the first command it finds that begins with the letter X, which more likely than not will be your XCOPY command. If not, simply press F8 again for the next match, and so on.

Stacking Multiple Commands on One Line

DOSKEY also lets you execute multiple DOS commands on one line. Separate the individual commands with a paragraph mark (§), which you get by pressing Ctrl-T. You can combine as many commands on one line as you want, as long as they don't exceed 127 characters (the size

mand and moves the cursor to the next line.)

There are several other ways to navigate through the command stack. The Page Up key will recall the oldest command in the stack (it may not be the first command, because if DOSKEY's buffer fills, it will delete the oldest commands to make room for newer ones). Similarly, the Page Down key will recall the most recent command in the stack. If you want to see the entire contents of the command stack, enter the following:

DOSKEY /HISTORY

Searching for Commands

As the number of commands in the stack increases, you might have trouble finding the command you want. DOSKEY's F7 and F9 keys can help. Pressing the F7 key, you will

see a numbered list of all commands in the stack. This is the same list displayed with DOSKEY /HISTORY but with line numbers attached. If you've been scrolling through the stack with the arrow keys, your current position will be marked with a greater than symbol (>) next to the line number.

Once you have the list of commands in the stack, note the line number of the command you want to recall. Now press F9. You'll get the prompt:

Line number:

Simply type the line number of the command you want and press Enter to recall it. Press Enter again to execute the command.

10

Uses
Only 4K
Of RAM

9

Record
Batch Files

limit of the DOS command line). When you press Enter, the commands will execute in order.

Let's say that you want to move a file from the C: drive to the A: drive ("move" meaning copy and then delete the original). You could enter:

```
XCOPY C:\BUDGET94.DB A: \ DEL
C:\BUDGET94.DB
```

DOSKEY will ignore the spaces before and after the paragraph mark, which make the commands easier to read.

How to Record Batch Files with DOSKEY

The DOSKEY command stack keeps a history of DOS commands as you enter them, so you can use DOSKEY to record a batch file. Here's how:

- Press ALT-F7 to clear the command stack. This starts you with a blank buffer.
- Enter the DOS commands you want in the batch file.

When done, press F7 to look at the commands. If they look good, save them to a file by entering:

```
DOSKEY /HISTORY > BATNAME.BAT
```

where BATNAME.BAT is the name of the batch file you want to create. The DOS redirection symbol (>) will write all commands in the command stack to the file instead of to the screen.

- You can now run the batch file by typing its name.

All This for Only 4K

DOSKEY is a memory-resident program, using only about 4K of RAM with its default buffer size. On 386 and 486 computers, you can install DOSKEY into upper memory with the LOADHIGH command, so it won't use any conventional memory at all. If you have extra RAM, you can increase the size of DOSKEY's buffer to store more commands and macros.

A mere 4K of space is a bargain for making the DOS command line

friendlier and more useful. DOSKEY gives you easier command line editing and the ability to create command macros and customize DOS's

own commands. If you've got DOS 5 or 6 and aren't using DOSKEY, give it a try. You'll never go back to the command line without it. ■

DOSKEY KEYS AND COMMANDS

Command Line Editing Keys

Left Arrow	Moves the cursor one character to the left.
Right Arrow	Moves the cursor one character to the right.
Ctrl-Left Arrow	Moves the cursor one word to the left.
Ctrl-Right Arrow	Moves the cursor one word to the right.
Home	Moves the cursor to the beginning of the line.
End	Moves the cursor to the end of the line.
Delete	Deletes the character at the cursor.
Backspace	Deletes the character to the left of the cursor.
Ctrl-Home	Deletes all text from the left of the cursor to the beginning of the line.
Ctrl-End	Deletes all text from the cursor to the end of the line.
Escape	Clears the command line (deletes everything).
Insert	Toggles between insert and overstrike mode.
Ctrl-T	Used to separate multiple DOS commands on the command line (displayed on the screen as ¶, the paragraph symbol).

Command Recall Keys

Up Arrow	Recalls the prior command in the command stack.
Down Arrow	Recalls the next command in the command stack.
PgUp	Recalls the first command in the command stack.
PgDn	Recalls the last command in the command stack.
F7	Displays a numbered list of the commands in the command stack, with 1 being the first (oldest) command. You can recall a specific command by pressing the F9 key and entering the desired number.
Alt-F7	Clears the command stack; all commands are deleted from the buffer and are no longer available.
F8	Recalls the last command in the stack that matches the text on the command line. Continue to press F8 to cycle through all the commands that start with those characters.
F9	Prompts you for a line number and recalls the command with that number. Use F7 first to get the numbered commands, then F9 to recall a particular command.

Macro Definition Symbols

\$1-\$9	Replaceable command line parameters (similar to %1-%9 in batch files).
\$*	All command line parameters.
\$B	Piping symbol ().
\$G	Output redirection symbol (>).
\$G\$G	Output redirection and append symbol (>>).
\$L	Input redirection symbol (<).
\$T	Separates individual DOS commands in a multiple command macro (similar to Ctrl-T on the command line).
\$\$	Represents the dollar sign (\$) in a command.

—K.J.

USING DOUBLESPEACE

DoubleSpace Casts A Long DOS Shadow

Because MS-DOS 6's data doubler changes more than the capacity of your disk, you might want to change a few of your DOS habits.

by Doug Lowe

If you've installed MS-DOS 6's DoubleSpace data-compression program, you know that DBLSPACE has a truckload of switches that qualify it as one of DOS's most complicated commands. But have you considered how DoubleSpace affects the way you use other parts of DOS? If you thought DoubleSpace would be transparent in the day-to-day use of your PC, you're in for a surprise.

Using DoubleSpace impacts several DOS 6 commands and utilities, including Microsoft Backup, Microsoft Antivirus, DEFRAG, SMARTDRV, CHKDSK, and DIR. Only the DIR command has switches that specifically relate to DoubleSpace, but the utility subtly and sometimes dramatically affects the way you use each of these commands and programs. I'll show you how to get the most from each of them when DoubleSpace is installed.

Contributing Editor Doug Lowe is the author of 15 computer books including The Only DOS Book You'll Ever Need (Murach), The Least You Need to Know about DOS (Murach), and the forthcoming Microsoft Guide to DoubleSpace (Microsoft Press).

SMARTDRV Runs Smarter

Did you know that the MS-DOS disk-caching program, SMARTDRV, gets a storage bonus from DoubleSpace? Because SMARTDRV caches compressed data, DoubleSpace effectively doubles the size of your disk cache!

The only trick to using SMARTDRV with DoubleSpace is to remember that SMARTDRV always caches your host drive (the drive on which DoubleSpace is installed), never your compressed drive. If your C drive is compressed, then the command SMARTDRV C: won't work. Instead, you must specify the host drive (for example, SMARTDRV H:).

If the SMARTDRV command in your AUTOEXEC.BAT file doesn't specify any drive letters, SMARTDRV caches all of your drives, including compressed drives, via their host drives. When you specify drive letters on the SMARTDRV command, though, you need to remember that you can't specify a compressed drive.

Incidentally, many of the initial problems users attributed to DoubleSpace actually were caused by SMARTDRV's write-caching feature. Using DOS 6's SMARTDRV is inher-

ently risky, because the cache holds data for as long as a full second *after* telling your application programs that data has been written successfully to disk. If something goes haywire at the wrong moment, write caching can scramble your files easily. Microsoft has promised a fix for this.

Because write caching is SMARTDRV's default behavior, you might want to disable it by changing the SMARTDRV line in your AUTOEXEC.BAT file. To disable write caching, you must list all of the drives you want to cache on the SMARTDRV line, like this:

```
SMARTDRV A B H
```

Here, I've listed my A and B disk drives as well as my DoubleSpace host drive, H.

A New Way to Use CHKDSK

You already know that you should use the CHKDSK command periodically to examine the integrity of your disk drive's directories and file allocation table (FAT). This rule of thumb is even more important when using DoubleSpace, be-

cause it uses additional allocation tables besides the directories and FAT. These tables are stored inside the compressed volume file (CVF), which holds the compressed data for a DoubleSpace drive.

With DOS 6, the DBLSPACE command provides a /CHKDSK switch that checks the internal structure of the CVF. Although you can run /CHKDSK from the DoubleSpace menu, you shouldn't bother. Use DOS's own CHKDSK command. When you use CHKDSK from the command line on a compressed drive, the utility automatically calls the DBLSPACE /CHKDSK command. This way, DOS's CHKDSK examines the traditional directory and FAT structure and then the internal CVF structure. If you use DBLSPACE /CHKDSK, you check the CVF structure but not the directory and FAT structure.

Also, don't forget that the survival of your compressed data depends upon the integrity of the host drive. On most systems, the host drive is drive H, but the drive letter assigned to the host can vary

if you have more than one disk drive, if you have a CD-ROM drive, or you operate on a network. It's important that you periodically run CHKDSK against the host drive to verify the integrity of its directory and FAT structure.

If you're not sure which drive is your host drive, type this command at the DOS prompt:

```
DBLSPACE /LIST
```

It displays a list of all the disk drives on your computer. For compressed drives, the list includes a CVF filename. The drive letter in that filename is the host drive.

Incidentally, DoubleSpace performs the equivalent of a DBLSPACE /CHKDSK command on your compressed drives every time you start your computer. This automatic check detects common allocation problems, such as lost clusters and cross-linked files. It is not as thorough as the examination performed by CHKDSK, however, and it doesn't check the integrity of the host drive.

(Note: Microsoft is readying a new version of DOS, known as MS-DOS 6.2. Microsoft has removed the /CHKDSK function from the DBLSPACE program and replaced it with the new ScanDisk program. According to reports in *PC Week*, an industry journal, ScanDisk will be a "fix-it" program, like Norton's Disk Doctor from Symantec. ScanDisk checks both the compressed drive and its host, so you don't have to check the host separately. —Ed.)

Defragging a DoubleSpace Drive

Unlike the other new utilities that come with MS-DOS 6, Microsoft DEFRAG is aware of DoubleSpace drives. Whenever you defragment a compressed drive, DEFRAG invokes the DBLSPACE /DEFRAG command to defragment the internal structure of the DoubleSpace CVF. Before you do this, you need to realize that defragmenting the CVF is a time-consuming process. So be sure to allow several hours for DEFRAG to do its job. You might want to let it run overnight.

DEFRAGMENTING A DOUBLESPEACE HOST

If you're the type who likes to live life on the edge, you'll probably get a kick out of defragmenting your host drive. It's a tricky procedure, so make sure you understand each step before starting.

1. Copy the ATTRIB.EXE and DEFRAG.* files from your \DOS directory to your host drive. You'll need them there in a later step. Boot from a disk that does not have DoubleSpace installed. To create such a disk, use the command `FORMAT A: /S`, then delete the hidden file `DBLSPACE.BIN` from the floppy with this command:

```
DELTREE A:DBLSPACE.BIN
```

(Unlike the DEL command, DELTREE can delete hidden files.)

2. Make C the current drive, and type `DIR /AH` to make sure DoubleSpace has been disabled. With DoubleSpace disabled, this DIR command should list the DoubleSpace system files, including `DBLSPACE.BIN`, `DBLSPACE.INI`, and `DBL-`

`SPACE.000`. If you don't see these files, you haven't disabled DoubleSpace. And if DoubleSpace is running when you defragment the CVF, you'll destroy your compressed drive!

3. Remove the hidden, system, and read-only attributes from the compressed volume file (CVF) using this command:

```
ATTRIB -H -S -R DBLSPACE.000
```

4. Run DEFRAG to defragment the drive.

5. When DEFRAG is finished, restore the CVF attributes with this command:

```
ATTRIB +H +S +R DBLSPACE.000
```

6. Remove the non-DoubleSpace system disk from the drive, and restart your computer.

—D.L.

What about the host drive? Should you bother to defragment it? Not on a regular basis. The host drive usually doesn't become fragmented. It is possible for the CVF itself to become fragmented, however. This can happen if you install DoubleSpace on a heavily fragmented disk without first running DEFRAG, or if you change the size of a compressed volume.

Defragmenting a DoubleSpace host drive can be tricky: see the sidebar "Defragmenting a DoubleSpace Host" for a step-by-step description of the process.

MSBACKUP Basics

Before running Microsoft DEFRAG, you should conduct a thorough backup. DOS 6's new backup program, called Microsoft Backup, or MSBACKUP, doesn't have any features that

relate directly to DoubleSpace, but the question of proper backup procedures can be a confusing one when DoubleSpace is involved. Should you back up the compressed drive, the host drive, or both?

In most cases, the answer is that you need to back up only the compressed drive, not the host drive. That way, you'll be able to selectively restore any file from the backup of the compressed drive. If you back up just the host drive, all of the files on the compressed drive will be backed up as a single file (the CVF). So you won't be able to do a selective restore.

For most users, the host drive serves only one purpose: It hosts the DoubleSpace system, including the CVF. If you're a Windows user, the host drive is also home to the Windows permanent swap file. As

long as the files on your compressed volume are backed up, everything else on the host drive is easy enough to recreate. So there's really no reason to back it up.

By the way, if you don't have a tape drive, now is the time to get one. Presumably, the reason you installed DoubleSpace was to increase the capacity of your hard drive. Once you fill your newly doubled disk, you won't want to back it up to disks anymore.

Hide and Seek for Viruses

Microsoft AntiVirus, or MSAV, is the new anti-virus utility that comes with MS-DOS 6. Like MSBACKUP, it doesn't have any options or features that are unique to DoubleSpace. However, you need to realize that your computer has a new place for viruses to hide—your host drive. Many users will be diligent about scanning their C drives for viruses, but they'll forget to scan their host drives.

DIR Makes the Switch

The DIR command works in much the same way for compressed drives as for uncompressed drives, except that Microsoft has added three new switches: /C, /CH, and /O:C.

The /C switch tells DIR to display each file's compression ratio. For example, typing the command:

```
C:\DOS>DIR E*. * /C
```

displays the compression ratio for all of the files in the \DOS directory that start with the letter E (see sample directory listing).

You would assume that /C calculates the compression ratio by dividing the uncompressed file size by the compressed file size. So, because the 413-byte EDIT.COM file reports 16.0 to 1.0 compression, DoubleSpace must have figured out a way to compress this file down to 25.8 bytes, right?

Wrong. /C calculates the compression ratio by dividing the amount of disk space that would be re-

TIP BE SMART ABOUT SMARTDRV

DOS 6's version of the SMARTDRV disk cache comes with a new feature called write caching that significantly speeds up disk writes. Unfortunately, it's not risk free: If a power failure or system reset occurs at the wrong moment, your files can become a tangled mess.

If the prospect of jumbled files scares you, you may disable SMARTDRV's write-caching feature while still benefiting from its read cache. All you have to do is edit the SMARTDRV line in your AUTOEXEC.BAT file, adding a drive letter for each disk drive you want to cache. If you want to cache drives A, B, and C, for instance, the command should read:

```
SMARTDRV A B C
```

Specifying drive letters in the SMARTDRV command activates read caching only; the utility's dangerous write-caching feature is disabled. Write caching is enabled only when you omit the drive letters from the AUTOEXEC.BAT line that invokes SMARTDRV, or if you precede them with plus signs, as in:

```
SMARTDRV +A +B +C
```

Note that if you're using DBLSPACE, you should specify the drive letter for your host drive, not the one for your compressed drive. For instance, if your host drive is drive H, you should edit the SMARTDRV line to read:

```
SMARTDRV A B H
```

If you're not sure whether you're using DBLSPACE or what drive you're using as a host drive, type DBLSPACE /LIST at the DOS prompt. This command tells you which drives are compressed and points out each compressed drive's host drive letter.

—Doug Lowe

Volume in drive C is DRIVE_C Volume Serial Number is 1BD1-0A40
Directory of C:\DOS

EDIT	COM	413	02-12-93	6:00a	16.0 to 1.0
EXPAND	EXE	16129	02-12-93	6:00a	1.0 to 1.0
EDLIN	EXE	12642	06-17-91	5:00a	1.5 to 1.0
EGA	CPI	58870	02-12-93	6:00a	2.1 to 1.0
EGA	SYS	4885	02-12-93	6:00a	2.0 to 1.0
EDIT	HLP	17898	02-12-93	6:00a	1.0 to 1.0
EXE2BIN	EXE	8424	06-17-91	5:00a	2.3 to 1.0
EMM386	EXE	115294	02-12-93	6:00a	2.2 to 1.0
		1.8 to 1.0 average compression ratio			
8 file(s)		234555 bytes			
		25542656 bytes free			

This sample directory lists all files that begin with E, showing their compression ratios.

quired to store the file in uncompressed form by the amount of disk space required to store the file in compressed form. Remember, DOS always allocates disk space in full clusters. As a result, EDIT.COM requires one full cluster, even though the file size is only 413 bytes. The /C switch assumes that the uncompressed file would be stored on a disk with 8KB clusters (16 sectors per cluster), so the EDIT.COM file would require 8KB to store.

But DoubleSpace doesn't allocate space in full clusters. Instead, it allocates space one sector at a time. So the program allocates just one 512-byte cluster to EDIT.COM. Because the uncompressed EDIT.COM file would require 8,192 bytes and the compressed version re-

quires only 512, the compression ratio is 8,192 / 512, or 16.0 to 1.0.

Is it fair always to assume an 8KB cluster size for the uncompressed file? It is if your compressed drive is larger than 256MB, because an 8KB cluster is required to support drives that large, compressed or not. If your compressed drive is smaller than 256MB, you should consider using the /CH switch, instead of /C.

/CH calculates the size of the uncompressed file using the cluster size of the DoubleSpace host drive. Before I installed DoubleSpace on my system, my 170MB drive used 4KB clusters. As a result, if I use the /CH switch, the EDIT.COM file reports a compression ratio of 8.0 to 1.0, instead of 16.0 to 1.0.

The /O:C switch lets you display directory listings with files sorted into compression ratio order, with the smallest ratios first. If you type /O:-C, the files with the largest ratios will be displayed first. (To omit subdirectories from the listing, add the /A:-D switch; without it, the directory listing will be cluttered with subdirectories.)

If you always want to see the compression ratios for your files, you can add the following command to your AUTOEXEC.BAT file:

```
SET DIRCMD=/C
```

This creates an environment variable named DIRCMD, which the DIR command uses to determine its default format for displaying directory listings.

Living with DoubleSpace

DoubleSpace isn't as transparent as Microsoft would have us believe. Subtle implications of using DoubleSpace abound, from new switches on a familiar command such as DIR to an obscure and hair-raising procedure for defragmenting a host drive (see the accompanying sidebar). Learning the ins and outs of using DOS commands with DoubleSpace is just part of the price you have to pay for doubled disk capacity. ■

CAN DOUBLESPEACE COMPRESS A ONE-BYTE FILE?

Can a 1-byte file be compressed? To find out, create one by typing this command:

```
COPY CON ONEBYTE.TXT
```

Next, press the space bar once, then press Ctrl-Z and the Enter key. Type this command to confirm the file size:

```
DIR ONEBYTE.TXT
```

The DIR command should list the file's size as 1 byte.

Now, type this command:

```
DIR ONEBYTE.TXT /C
```

How can DIR possibly list the compression ratio for this file

as 16.0 to 1.0? Can DoubleSpace magically squeeze the eight bits of this file into just half a bit?

Not hardly. This is just an extreme case of how DoubleSpace takes into account cluster allocation when it reports compression ratios. Even though the ONEBYTE.TXT file has only 1 byte of data, it still requires a full cluster to store in uncompressed form. DoubleSpace, in contrast, requires only a single 512-byte sector to store this file, hence the 16.0 to 1.0 compression ratio.

DoubleSpace still wastes 511 bytes (or 99.8 percent) of the sector needed to store this file. But that's better than the 8,191 bytes (99.99 percent) of the wasted space for the uncompressed 1-byte file!

—D.L.

B A T C H - F I L E M E D I C

When a Simple Y/N Won't Do

Make your batch files a little friendlier by calling missing parameters or filenames during their execution.

by Hardin Brothers

Sometimes repetition is the mother of invention. I've received several letters lately asking the same question: Can we create friendlier batch files by prompting users for missing input?

Kenneth Hart of Austin, Texas, states the problem most succinctly: "As we all know, we can enter variables (%1 to %3, in this case) from the command line as BATCHFILE VARIABLE1 VARIABLE2 VARIABLE3. My question is: Can we type in variables from within a batch file or call a separate batch file or program to perform the task? Most 'keyget' programs and DOS 6's CHOICE utility can handle only a single keystroke. I want to type in variables that contain multiple keystrokes and an Enter key."

My first answer to this popular question was no. The batch-file language isn't meant to be interactive.

After almost every utility maker in DOS-land added a KEYGET utility of some kind, Microsoft bowed to

the pressure and included CHOICE.COM in DOS 6. All programs of this type retrieve a single keystroke from the user and return it to a batch file as an error level. A single keystroke is not a full variable, however. If your batch file needs the name of a subdirectory, for example, providing a simple menu choice of A or B won't help much.

One solution is to use an alternative batch-file language that offers a more expansive set of commands than those available in MS-DOS. But can you retrieve user input without purchasing a special utility? Yes, if you mix batch-file techniques, such as redirection, recursion, and file manipulation, then add a 39-byte DEBUG utility.

The Chain of Command

If you've never written a batch file that uses command-line variables, you're missing out. Command-line variables (or parameters, as they're sometimes called) make almost all batch files more powerful and more flexible. For example, if you write a batch file to back up your data every evening, you may use command-line variables to tell the batch file from

which directory to copy your data and to which drive to copy it.

When you type a command at the C:\> prompt, the command interpreter divides it into two parts. The first word (everything up to the first space or tab character) is the command, which can be the name of an internal DOS function such as DIR, an executable program such as QBasic, or a batch file. Everything else on the command line is the command tail. Often, the command tail is empty, because the user types only a single command word.

When the command interpreter runs a batch file, it divides the command tail into individual words and again assumes that words are separated by spaces or tab characters. It puts each of the words from the command tail into a numbered variable. Inside the batch file, the first word from the tail is stored in %1, the second in %2, and so on. The special variable %0 holds the first word from the command line, which for a batch file is its own name.

For example, the following batch file displays the contents of variables %0 to %3:

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```
@ECHO OFF
ECHO My name is %0
ECHO Variable 1 is %1
ECHO Variable 2 is %2
ECHO Variable 3 is %3
```

Save this program as TEST1.BAT, and then run it by typing TEST1 ABEL BAKER CHARLIE. On the screen, you should see:

```
My name is TEST1
Variable 1 is ABEL
Variable 2 is BAKER
Variable 3 is CHARLIE
```

You can use command-line variables in a variety of ways. Typically, they hold file or directory names, switches that select program options, or even passwords. Experiment with them a little (you can start by modifying the demonstration program above), and you'll soon find that they are easy to understand and use.

Redirecting Input and Output

All of DOS's internal commands and most simple programs read from "standard input" and write to "standard output." This means they use the simplest method possible to get user input and display data on the screen. It also means that their input and output can be redirected. (Full-blown application programs usually use advanced techniques for faster and more powerful input and output, instead of using the standard channels; consequently, they can't use redirected input and output.)

When you redirect the input for a command or program, it no longer gets keystrokes from the user. Instead, the input comes from another device, such as a modem, or from a file. When you redirect output, the program prints to something other than the screen, perhaps to a file or the printer. The program never knows that its in-

put or output is redirected; DOS takes care of the details and lets the program act as if its input were coming from the keyboard and its output were going to the screen.

To redirect input, you must use a less than (<) or greater than (>) sign on the command line. For example, the command XWRITE < MYFILE.ASC tells DOS to run a hypothetical program called XWrite and give it input from a file called MYFILE.ASC, instead of from the keyboard.

Of the two output redirection symbols, the greater than sign is used most often. The command XWRITE > MYFILE.ASC tells DOS to run XWrite and send its output to a file called MYFILE.ASC. You may, for example, have used redirection by typing the command DIR > PRN, to send a directory listing to the printer.

You also may use two greater than signs to redirect output. The symbols > and >> have the same effect, except when you are redirecting output to a file that already exists. A single greater than sign tells DOS to erase the file and create a new one before redirection begins. The double greater than sign tells DOS to add the redirected output to the end of the existing file.

One way batch files can write to a file is to use the ECHO command along with redirection. For example, consider the following line:

```
ECHO This is a test > MYFILE.ASC
```

It creates a new file called MYFILE.ASC and adds the message "This is a test" to that file. You may use this technique to solve the problem at hand.

A program whose input or output is meant to be redirected is called a filter. The MORE utility, included with DOS, was designed to receive its input from a file or another command. It displays one screen of data and then waits for a keystroke

before displaying the next screen. Although you may use MORE by itself, you have little reason to do so. SORT and FIND are two other DOS filters that don't do much unless you redirect their input or output.

A Batch File That Calls Itself

Another piece to the puzzle may be found in recursive batch files. *Recursion* is another computerish word, such as *variable* or *redirection*, that sounds more intimidating than it is. Any program or part of a program that restarts itself, directly or indirectly, is recursive.

To see infinite recursion in action, create a new batch file called TEST2.BAT, which looks like this:

```
@ECHO I'm recursive
@TEST2
```

When you run the program, it displays a message and then calls itself again and again. You must press Ctrl-C or Ctrl-Break to regain control of your computer.

This example makes batch files that call themselves look pretty useless. But they can be quite powerful, as I'll soon demonstrate.

Building the Solution

Let's go back to TEST1.BAT, the simple program that displayed three variables. And let's assume, for some reason, that you want to make sure the program has exactly three variables before it displays any of them. If it receives more than three, it will stop and display an error message. If it receives fewer than three, it will ask the user to type in the missing variables.

Admittedly, this is a demonstration program. A real, working batch file might need the names of two directories plus the names of some files, or it might need the day of the week and the name of a drive. But using a demonstration program lets me focus on explain-

ing the logic needed to force the user to supply the correct number of variables and avoid complications caused by other problems, such as finding and copying files.

Here's the logic for this program:

- If variable 1 does not exist, get it from the user and send it to this batch file.
- If variable 2 does not exist, get it from the user and send it, along with variable 1, to this batch file.
- If variable 3 does not exist, get it from the user and send it, along with the first two variables, to this batch file.
- If variable 4 *does* exist, scold the user for typing too much.
- Display variables 1, 2, and 3.

This logical progression shows the procedures involved in solving one part of the original problem: collecting the correct input from the user. But you still have to get that input back into the batch file. One method for doing this involves invoking the batch file again, this

time adding the user's input to the end of the command tail.

If this concept seems cloudy to you, think of it this way. When the user provides only one variable by typing a command such as TEST ALPHA, the program asks for a second parameter and then runs the command TEST ALPHA USERINPUT. This method feeds the user's input back to the batch file in a useful form. The important part of the batch file looks something like this (remember the batch file is called TEST.BAT):

```
IF NOT "%1" == "" GOTO OKAY
COLLECTINPUT
TEST USERINPUT
:OKAY
other instructions
```

But to feed user input back to itself, the program must have some way to collect it. DOS provides at least one method of doing so. The command COPY CON *filename* lets the user type as much information as necessary into a file. When the user presses Ctrl-Z (or F6) and then Enter, DOS closes the file and returns to the DOS prompt.

That's the second part of the solution. To collect user input, use these lines:

```
ECHO Type in the parameter
ECHO then press Ctrl-Z and
Enter.
COPY CON TEMP1 > NUL
```

The first two lines give the user instructions. The third takes whatever the user types and stores it in a temporary file. The last part of the line, > NUL, sends COPY's output to the NUL device, so that the user won't see the command's "1 file(s) copied" message on the screen. The NUL device is simply DOS's way of discarding input; COPY thinks it is displaying helpful information using standard output, but NUL keeps that information from appearing anywhere.

The Final Steps

OK, the user's input is now in a temporary file. How does TEST call itself and add the contents of the file to the command tail? The next step is deciding how to make the recursion happen with the correct command line.

The secret here is using indirect recursion, which means TEST.BAT must start a second batch file that will, in turn, start TEST.BAT again. That second batch file will be created interactively.

Begin by saving the name of the current batch file, along with the current command tail, in a new file. Redirection makes this possible:

```
ECHO %0 %1 %2 %3 > TEMP2 > NUL
COPY TEMP2 + TEMP1 TEMP.BAT
```

This creates a batch file, TEMP.BAT, which has all the necessary ingredients. It uses the current batch-file name as its command, the current command tail, and whatever the user types. You then can invoke it and rerun the current batch file, by typing TEMP, which runs TEMP.BAT. In turn, TEMP.BAT reruns the current batch file.

This looks as if it should work, but it doesn't, because the line ECHO %0 %1 %2 %3 > TEMP2 adds the equivalent of the Enter key after its output. The user's input is on a second line, but we need to put it at the end of the first line.

The Enter is stored in a file as a carriage return (ASCII 13), followed by a line feed (ASCII 10). If you can change these characters into spaces, you'll be in business, because everything will be on one line.

The easiest way to make minor changes of this sort to a file is to create a filter. You send the file to the filter as input and redirect the output of the filter to a new file. The new file will contain the changes the filter has made. The best tool for making a simple filter is DEBUG, a utility included with all versions of MS-DOS and most versions of PC DOS.

NOCTRL.SCR is a **DEBUG** script that lets you create **NOCTRL.COM**, which removes all carriage returns and line feeds from a file by changing all control codes into spaces.

```
A 100
MOV AH,3F
SUB BX,BX
MOV CX,1
MOV DX,80
INT 21
JC 0125
CMP AX,1
JL 0125
MOV SI,80
MOV DL,[SI]
CMP DL,20
JNB 011F
MOV DL,20
MOV AH,2
INT 21
JMP 0100
INT 20

N NOCTRL.COM
RCX
27
W
Q
```

End

The filter I developed for this problem does a little more than simply remove carriage returns and line feeds. NOCTRL.COM (see program listing) changes all control codes, or all characters with ASCII values of less than 32, into spaces. It reads its input one character at a time from standard input and checks each character. If it finds a control character, it sends a space to standard output. Otherwise, it just sends the input character to standard output. The filter is done when it comes to the end of its input.

To create NOCTRL.COM, use a text editor to copy the listing, including the blank line, to a file called NOCTRL.SCR. Make sure that DEBUG is available in the current directory or in your PATH statement. Then issue this command at the DOS prompt:

```
DEBUG < NOCTRL.SCR
```

DEBUG then creates NOCTRL.COM, storing it in the current directory.

The filter is the last piece of the puzzle. You may now replace the last two lines described earlier with these lines:

```
ECHO %0 %1 %2 %3 > TEMP2
COPY TEMP2 + TEMP1 TEMP3 > NUL
NOCTRL < TEMP3 > TEMP.BAT
TEMP.BAT
```

The program listing for KEYSGET.BAT shows the entire batch file, which includes some file renaming to make it run more smoothly. I've used the extension \$\$\$ on temporary files to make them easier to name, keep track of, and erase.

Try running KEYSGET.BAT, using one, two, or three variables. Try it with four. When you know how it works, you may add its techniques, along with NOCTRL.COM, to your own batch files to make them easier to use. You'll no longer have batch files that fail because you forgot to add the required information to the command tail, and each batch file will be able to prompt you for the information it needs. ■

KEYSGET.BAT is a demonstration program that shows how you may use NOCTRL.COM to retrieve multiple keystrokes from the command line while a batch file is running.

```
@ECHO OFF
REM
REM WARNING!
REM
REM Creates and erases several files with the extension $$$
REM and one file called $$$BAT. Any files with that name or
REM extension in the default directory will be destroyed.
```

```
REM Erase any temporary files:
```

```
IF EXIST *.$$$ DEL *.$$$ > NUL
IF EXIST $$$BAT DEL $$$BAT > NUL
```

```
REM Check the first variable:
```

```
IF NOT "%1" == "" GOTO OKAY_#1
ECHO.
ECHO Enter the first variable.
GOTO GETPARAM
```

```
:OKAY_#1
```

```
REM Check the second variable:
```

```
IF NOT "%2" == "" GOTO OKAY_#2
ECHO.
ECHO Enter the second variable.
GOTO GETPARAM
```

```
:OKAY_#2
```

```
REM Check the 3rd variable:
```

```
IF NOT "%3" == "" GOTO OKAY_#3
ECHO.
ECHO Enter the third variable.
GOTO GETPARAM
```

```
:OKAY_#3
```

```
REM Are there too many variables?
```

```
IF "%4" == "" GOTO ALL_OKAY
```

```
ECHO.
```

```
ECHO You have entered too many variables. The program needs
```

```
ECHO only three, but you entered: %4 as the fourth.
```

```
GOTO END
```

```
:ALL_OKAY
```

```
ECHO.
```

```
ECHO My name is %0
```

```
ECHO Variable 1: %1
```

```
ECHO Variable 2: %2
```

```
ECHO Variable 3: %3
```

```
GOTO END
```

```
:GETPARAM
```

```
ECHO Then press Ctrl-Z followed by Enter.
```

```
COPY CON USER.$$$ > NUL
```

```
ECHO %0 %1 %2 %3 > CMD.$$$
```

```
COPY CMD.$$$ + USER.$$$ TEMP.$$$ > NUL
```

```
NOCTRL < TEMP.$$$ > $$$BAT
```

```
$$$
```

```
:END
```

End

D O S O N - L I N E

Hook Up with The DOS World

If it's bargain software and technical advice that you need, these five electronic services have your number.

by David H. Rothman

A mysterious culprit kept turning on a business computer after hours. How to catch the offender? Just what was happening in the office after dark?

Puzzled, a security-minded employee dialed up CompuServe. He wanted a DOS utility program that could tell him who was using the computer, and at what times. Within three hours, an answer to his request came on-line: Try LOGON.ZIP, found in the DOS Utilities library of CompuServe's IBMSYS area.

It's easy to see why the answers came so quickly on-line: CompuServe boasts some 1.5 million subscribers. Hundreds, if not thousands, may have read the posting about the security problem.

Of the more than 50 million DOS

users, at least several million subscribe to electronic services, such as CompuServe, Prodigy, America Online, GENie, and the networks that make up the giant Internet. On-line, these users avoid wasting time and money waiting on the phone for technical support, and they usually do not pay a penny beyond the monthly or hourly fees a service charges.

Most important, CompuServe and its brethren let subscribers pick up shareware (publicly distributed programs that can be previewed before buying) and even free software, known as freeware. Most programs have been screened for viruses, and the selection is tremendous—spreadsheets, word processors, communications programs, DOS utilities, and so on. In fact, a “netaholic” can lead a full, electronic life without ever setting foot in a computer store.

On-line services also boast discussion areas devoted to DOS programs and IBM-style hardware. If you buy a program at Egghead or Software Etc., or equipment at Circuit City, you probably will be able to find a support group on-line.

And the services are better bargains than ever. Special communications programs have made CompuServe and others easier to learn and use, with little or no charge to users. At the same time, prices for modems continue to drop. Some new 2,400-bps models sell for less than \$50, while speedy 14,400-bps modems are going for as little as \$150.

The trick, of course, is finding the service that's best for you, without spending long hours in the process. This article will help get you started. On the next few pages, you'll get the lowdown, from a DOS user's perspective, on the five most popular services. Eventually, however, you may want to try other, smaller networks. Delphi (800-695-4005), for example, has fewer users, but it offers a good hookup into the Internet, the huge network of networks that may become the backbone for a national information highway.

Dial Up Prodigy And Put on the Training Wheels

Prodigy is an easy-to-learn network that many liken to a bike

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with training wheels. With a Mac-like interface, Prodigy works best when you use a mouse.

To reach DOS-related material, click on the Jump command with your mouse, and type the word Computer, which will take the cursor bar to the Index of Jumpwords. Press Enter. You'll see an alphabetical list with terms such as Computer Ailments, Computer Basics, and Computer Club (not all will appear on the same screen). This will give you an overview of computer-related choices; sorry, Prodigy doesn't offer a master Jumpword for DOS.

For a quick trip to various bulletin boards, simply use the Jumpword Computer BB, and you'll go right to the boards. Within that area, you can click on "See Notes in This Topic" and select from those titled Beginners, Hardware Systems, Operating Systems, Shareware Discussion, and Shareware Trading, to name a few. (A warning: Commands on Prodigy and other services change from time to time. Check with the individual services if commands in this article don't seem to work.)

Ready to download some software? Then sign up for ZiffNet for Prodigy. It lets novices easily catch up with DOS utilities. You can begin with one called ZiffNet Download Manager, which expands "zipped" files (that's the jargon for those files compressed to save transmission time) and helps you manage them on your hard drive. No matter which service you're using, look for PKZIP-style shareware and ask about other popular compression programs in use.

Within ZiffNet for Prodigy, you also will see DOS application software ranging from spreadsheets (such as Easy) to word processors (PC-Talk) and even communications programs (such as Qmodem),

which are useful on BBSs and some other services. Typically, the authors of these programs request fees of less than \$75—sometimes a fraction of that.

ZiffNet for Prodigy includes just several thousand files, but the commands are ultra-easy to understand. Also, ZiffNet plays up the most popular, most proven shareware, and the system operators (sysops) thoroughly examine all software for viruses. ZiffNet, moreover, supplies good technical support, especially for the DOS-baffled. Clearly ZiffNet for Prodigy makes plenty of sense for the many novices who value sturdy training wheels.

America Online: The Big Easy

Like Prodigy, America Online was designed from the start to work with a mouse. It's about as simple to use as Brand P, and its screens are among the snazziest-looking in the on-line world.

If you're searching for DOS-related forums or programs of a certain kind, the "open sesame" is the Directory of Services, which you can reach by clicking on the main menu's Go To option. Within the Directory, click twice on "Search the Directory of Services." Type in the name of the topic, press Enter, and you'll see listings. The word DOS elicits items ranging from the PC Applications Forum to areas

pertaining to WordPerfect, Microsoft, and other companies that produce DOS software.

If an item in the Directory intrigues you, just double-click on it with the mouse, and you'll whiz right there. Or you can press Ctrl-K and supply the keyword if you know it. Ctrl-K, in fact, works just about anywhere within America Online. Use Ctrl-K and the keyword *Computing* to get to the Computing and Software area. Here's a sampling of what's available:

- PC World Online offers support and shareware.
- The MS-DOS 6.0 Resources Center can help you even if you're running DR DOS rather than a Microsoft operating system.
- Industry Connection summons up the support areas of dozens of companies, such as Leading Edge, Aldus Corp., and Central Point Software.
- Software Center lets you search through more than 34,000 files, a good many of them DOS-related. Also, you can click on Software Listings (you may have to scroll down within a long list to find it) and download a file-of-files that names all of the goodies the service offers. America Online also provides a viewer to read the list offline. What's more, from anywhere on the network, you can use Ctrl-K

TIP LAPTOP BACKUPS

If you have a laptop computer, you probably use DOS 6's new MSBACKUP utility to transfer files between your desktop PC and your laptop. If your laptop has a liquid-crystal display (LCD), type this command to invoke MSBACKUP:

MSBACKUP /LCD

You'll get a special display that makes your LCD screen easier to read.

—Kay Yarborough Nelson

and the keyword *Filesearch* to find programs by filename, category, and other means.

● Finally, within the Knowledge Base—directly reachable through the keywords *Knowledge Base*—you'll find a huge database of information for people with questions about DOS and other Microsoft products.

CompuServe's Cure for DOS-aholics

CompuServe may be the best bet for DOS junkies who can afford the typical \$8-an-hour rate. Tens of thousands of DOS utilities and programs can be found there.

Because the cyber-landscape on CompuServe is so vast, it's easy to get lost without some handy commands. Not to worry. If you aren't using a program designed for CompuServe, just remember your friend the exclamation mark (!). From this prompt, you can fetch electronic road maps. Just type *FIND*, a space, and your choice of

topic. *FIND DOS* (plus Enter) will steer you to the many forums of interest to DOS users.

The main navigation tool, however, is the word *G0*, followed by a space, the name of the area you want, and Enter—for example, *G0 Microsoft*. (Please note that software designed for CompuServe may ask you to fill in a blank rather than typing *G0*. But the idea is the same.)

G0 IBMFF takes you to the IBM File Finder area, which cross-indexes tens of thousands of DOS-related files. You can search by keyword, program name, and so on. I can't say for sure that CompuServe has more DOS-related files than any other commercial network, but odds are that it does, and *IBMFF* can help you keep up with CompuServe's huge collection.

Another handy area is *IBMAPP* (short for IBM Applications Programs), which features all kinds of software, such as word processing

and spreadsheet programs. Within the forums, including *IBMAPP*, be sure to visit the library and look for references to catalogs of shareware programs and other files. You can check your CompuServe manual or read a third-party book to learn the details.

Among other things, you'll need to know how to reach the library from within a forum (perhaps via the *LIB* command or an equivalent menu item); arrive at the proper section of a library (probably visible on a menu); search for files with the browse command (perhaps *BRO VDE*. ** to find files devoted to the *VDE* text editor, if you aren't using a program to simplify CompuServe); or fetch files by keyword (perhaps with the *KEY* command).

If you're a novice, visit the IBM New Users/Entertainment forum, *IBMNEW*. It's a great place for you to ask questions and pick up essentials, such as the latest *PK-ZIP/PKUNZIP* programs, so you can read compressed files.

ASP is a good bet for novices and old-timers alike. It's short for the Association of Shareware Professionals, whose area offers a king-size catalog of shareware. *ASP* even has an ombudsman to help monitor the trade.

For communications software, including third-party programs for CompuServe itself, try the IBM Communications Forum, *IBM-COM*. Within *IBMCOM*, you can pick up communications programs, such as *OZCIS*, which lets you read and write messages off-line to save time. CompuServe itself offers several excellent communications programs. Among them is CompuServe Information Manager for DOS, which you can get on-line through the *CIMSOF* forum.

Also consider visits to the IBM Programming Forum (*IBMPRO*), the IBM Systems/Utilities Forum (*IBMSYS*), the IBM PC Users Network (*IBMNET*), and the IBM Systems Hardware Forum (*IBM-HW*), all of which serve owners of

Send Us Your Shareware

Just about the only thing *DOS Resource Guide* readers like more than a good DOS tip is a great bargain on software. And there's no better buy than shareware: software that you try out for free, then register for a fraction of the cost of store-bought equivalents.

Frankly, we can't keep up with developments in the grass-roots world of shareware. We need your help. If you're using a new shareware program that seems to be a cut above the rest, or that simply does something unique or interesting, let us know. We want diamonds-in-the-rough—not old favorites such as *PKZIP* and *PC File*, but lesser-known gems with a shot at becoming this year's hits.

Send the name of the program, a 500-words-or-less description, and where we can find it, to:

Shareware Editor
DOS Resource Guide
 80 Elm St.
 Peterborough, NH 03458
 Or use our on-line addresses:
 CompuServe (75300,2361)
 MCI Mail (469-7260)
 DRG BBS (603-924-3181)

We'll also consider public domain software, a less common type of software that has no license fees. (Programs recommended by their authors are not eligible).

DOS Resource Guide will pay \$50 for every shareware tip that we publish. The money won't send your kid to college, but it might be enough to register the shareware—if you haven't already.

compatibles, not just those with True Blue machines. The IBMHW forum is outstandingly useful for hardware problems not covered by specific vendors in their own forums.

Yet another possibility is one of the Microsoft areas (MICROSOFT) for the MS DOS Forum (also reachable as MSDOS), which features the Microsoft Knowledge Base and other attractions.

Uncorking GENie's Treasures

GENie offers a great DOS-compatibles forum presided over by an enthusiastic sysop, not to mention lots of other valuable services. In GENie lingo, the equivalent of a CompuServe forum is a RoundTable, or an RT.

File junkies will enjoy GENie's new rate structure. If you downloaded files before July 1, 1993, you normally shelled out \$6 an hour in non-prime time. Now it's just \$3 an hour in the evening and on weekends, and each month you get four non-prime hours a month free with your monthly subscription of \$8.95. The bad news is that GENie bulletin boards, many or most of which were free in the evenings and on weekends, now cost \$3 an hour.

Still, that's cheap by on-line standards, and the DOS areas should be well worth the money. The IBM PC RoundTable contains more than 14,000 DOS files. I encountered helpful and knowledgeable sysops, and if you're a novice, that's probably going to count just as much as sheer file volume.

For a fast overview of GENie services for DOS users, type m514 (plus Enter) or IBM (plus Enter) from the main prompt. Among the entries, you'll see those for users of Borland, WordPerfect, and Microsoft products (including MS-DOS).

In the IBM PC RoundTable (directly reachable with m615), you can find information on both the Microsoft and non-Microsoft versions of DOS. Within the IBM PC RoundTable's bulletin board (selection 1 of the main menu, at the time I

TIP USING MSAV

If you experience a problem booting from your hard drive and you suspect a virus is at fault, run MSAV.EXE (if you have DOS 6) as soon as you get your system running again. But don't stop after your hard disk is working properly. Scan your floppy disks, also, starting with the ones you used most recently. They also may harbor the virus. If you have a tape-backup unit, be aware that it, too, may be infected. Restore it onto your hard disk and scan the restored files, or reformat your backup tape so that you aren't tempted to restore from a tape that might be infected.

—Kay Yarbrough Nelson

looked) appears topics, such as word processors, other applications, utilities, and operating systems.

If you don't have special software, plan on spending some time learning to use GENie. The IBM PC RoundTable's BBS, for example, will take a minute or two to start up with customization procedures, such as adding your name. Then you can conquer some basic GENie BBS commands:

- NAM (plus Enter) activates a prompt to give your nickname.
- TOP (plus Enter) elicits a list of topics within a category.
- CAT (plus Enter) shows a list of categories—for example, the ones for utilities or operating systems (DOS, Unix, OS/2, DR DOS, and so on).
- SET (plus category number and Enter) takes you to a category of related topics.
- REA (plus topic number and Enter) lets you read a topic.
- EXI (plus Enter) takes you back to the main menu of the IBM PC RoundTable.

To reach the Utilities area, type SET 4, which, of course, is Category 4. There, you'll see a grass-roots version of the Microsoft Knowledge Base. When I checked in, I saw tips on the Stacker compression program, disk-caching programs, and a discussion of PKZIP and PKUNZIP.

Once you've found what you want, move on to the IBM PC RoundTable's file area. Wave goodbye to the BBS, using the EXI com-

mand, return to the main PC RoundTable area, and choose the third item on your menu, IBM Software Libraries.

Within that menu, you can:

- Choose the command Set Software Library, and select All.
- Select the command Search File Directory, and type in the keyword mentioning the name of a program.
- Go on to "Download a File." Type a program number and get a prompt telling you to fetch a file by choosing "d." Next, GENie presents you with a list of protocols, such as XMODEM or ZMODEM, that you can use. Then go on with the actual download.

No, there isn't room here to describe all of GENie's treasures, but these brief instructions should help put you at ease with what is now a promising, but hard-to-use, service. This year or next, GENie plans to release custom software that will be simpler to use than Aladdin, the powerful, yet challenging, program that automates GENie commands.

Internet: The World at Your Fingertips

The Internet is a network of networks that goes all over the world. And so, in picking up a DOS file, you unwittingly might acquire a virus fresh from Eastern Europe or the Mideast, courtesy of one of the other 15 million people on the 'net.

Having issued this disclaimer, may I say I'm an Internet addict? I can dial into the Library of

Congress, retrieve electronic copies of literary classics, and swap E-mail and public messages—all for just \$25 a month through a local

service. Using the Internet, you, too, can enjoy the following:

- Thousands of news groups, in-

cluding a slew of them on MS-DOS and other PC-related topics. Just a few of the ones to check out are comp.archives.msos.announce (which includes announcements of new MS-DOS-related files available for downloading); comp.os.msos-.misc (odds and ends about DOS computers); and machine-specific groups, such as alt.sys.pc-clone.gateway2000 (for Gateway 2000 users).

- FTP, a way to download files from electronic libraries throughout the world. If a flat-fee arrangement is available for Internet use in your area, it could be a real boon for collecting file after file without tying up local BBSs.

- Telnet, a procedure that lets you connect with computer systems at the Library of Congress and elsewhere and issue various commands, such as ones that will guide you through the Library's catalog.

- Gopher, Archie, and other tools you can use to search the network for the files you need. After you type in a search word, Gopher lets you find material on designated topics from computers around the world. It also can serve as a fast route into other computer systems; you just choose them from a list. From a DOS user's perspective, Archie may be the best thing going on the Internet. You merely type in a filename and reach a computer that carries the material you want.

Net at Night

In an era when Vice President Al Gore keeps talking up the Internet and other networks as the forerunners of super-high-speed data highways, DOS users needn't be left behind. Years from now, some of us still will be swapping AUTOEXEC.BAT and CONFIG.SYS tips on-line—if only for old-time's sake. Meanwhile, why not log onto today's nets? You never know who you'll meet there. Perhaps that nocturnal computerist (the one who sneaked into the office after hours) just wanted to pick up some DOS pointers while the rates were low. ■

PRODUCT INFORMATION

America Online

America Online Inc.
8619 Westwood Center Drive
Vienna, VA 22182
800-827-6364

Typical monthly cost is \$9.95, with five hours of free service and \$3.50 hourly charges beyond that. One way to join is to buy the PC edition of *The Official America Online Membership Kit & Tour Guide*, written by Tom Lichty (Ventana Press; 919-942-0220). The *Guide* (\$34.95 at bookstores) comes with the requisite software and 10 hours of free connect time.

CompuServe

CompuServe Information Service
5000 Arlington Centre Blvd.
Columbus, OH 43220
800-848-8199

A membership kit costs less than \$45; in fact, membership comes free with many modems and other products. Typical charges are \$8.95 a month and \$8 an hour. The \$8.95 does *not* include DOS-related and most other forums, but it does offer a generous number of E-mail messages and other basic services, such as news bulletins.

GEnie

GEnie Services
401 N. Washington St.
Rockville, MD 20850
800-638-9636

The GEnie charge of \$8.95 per month provides four hours of use. You pay \$3 per hour after that for standard services. Charges are higher for premium services. For light users interested in picking up DOS files at low hourly rates, GEnie and America Online might offer the best buys.

Internet

(No one location, no single charge)
For a list of providers, contact the

Internet Society at 1895 Preston White Drive, Suite 100, Reston, VA 22091 (703-648-9888; annual dues \$70).

Also, check out the communications areas of commercial services, such as CompuServe, for files listing providers, as well as people who can help you choose the best ones in your area.

One of the better books about the Internet is *The Whole Internet User's Guide and Catalogue*, written by Ed Krol and published by O'Reilly & Associates (\$24.95; 800-998-9938). It explains the network in detail and lists main areas of interest.

Prodigy

Prodigy Services Co.
445 Hamilton Ave.
White Plains, NY 10601
800-PRODIGY (800-776-3449)

Prodigy's start-up kit sells for around \$30, and you can price your time on-line in one of several ways. For example, you can pay \$14.95 a month under the Value Plan and spend nothing extra on Core services, such as news summaries. Plus services, including computer-related bulletin boards, charge at least several dollars an hour beyond basic fees. The Value Plan includes two free hours of Plus services.

ZiffNet for Prodigy

Ziffnet Information Service
25 First St.
Cambridge, MA 02141
800-666-0330

Beyond normal Prodigy costs, ZiffNet charges a monthly fee of \$14.95 per member for three hours of use, plus 10 cents per minute after that. Some other services are cheaper for file-downloaders, but novices might benefit from the ease of use available from the ZiffNet-Prodigy combination.

—D.H.R.

UPGRADE TRIBULATIONS

Hard Lessons About Hard Drives

Or, how to turn a simple drive-replacement job into four days (and nights) of utter torture.

by Hardin Brothers

Something is wrong with my hard disk."

My wife was rushing to meet a deadline, and suddenly her hard drive wouldn't record new data. If I had taken her computer to a repair shop and left it for a day or two, but she might have missed her deadline. Instead, I decided to loan her my computer and tackle the job myself. That was my first mistake. While waiting for me to fix her machine, she fell in love with mine.

Whether you like to learn from others' mistakes or simply to gloat while watching someone suffer, you might appreciate my story. It's a tragicomedy filled with lessons for all who set out down the same path. I thought I knew my way around the inside of a computer as well as anyone. But I hadn't counted on the number of times Murphy's Law could strike one repair job.

The Grim Diagnosis

First, of course, I had to analyze the problem. I tried Norton Disk

Technical Editor Hardin Brothers has been working with and writing about computers for 14 years.

Doctor (part of Symantec's The Norton Utilities) and Gibson Research Corp.'s SpinRite II. Both scan the disk for bad sectors, then transfer data from the bad sectors to good sectors, and mark the bad ones so that DOS can't use them. Also, both utilities can find sectors that have been marked erroneously as bad and return them to use.

On a healthy disk, either program may churn for a while (SpinRite's thorough test can take more than 12 hours) only to discover one or two marginally bad sectors. On my wife's hard drive, both programs found dozens of bad sectors. When I ran the utilities again, they marked several dozen more sectors as bad and some of the bad sectors as good. That's a clear sign of a failing hard disk, disk controller, or both. The diagnostic programs confirmed my wife's original judgment: It was time to replace the drive.

LESSON 1:

Set your backup options correctly before you start.

Replacing a hard drive is simple, at least in concept. You must back up

all of the data, remove the drive and controller board, slide a new drive and controller into place, partition and format the new drive, and restore the data you saved. If everything goes right, the job should take about 30 minutes plus the time needed to back up and restore your data.

So I formatted a new backup tape and saved every file on the hard drive. Unfortunately, I set the backup utility's options incorrectly, so that the program stopped every time it encountered an error. I'd watch for a while, then leave the office to do something else. When I returned, usually I would find the tape program had run into a snag and had been waiting for more than an hour for me to press a key. But if I had reset the program's options, I would have had to restart the entire backup. Unfortunately, this was just another in a long list of mistakes.

I kept a written list of the files the program could not back up correctly because of the failing hard drive. Luckily, they were all EXE and DLL files—easy to recover from installation disks. Just as luckily, I

could tell from the filenames to which programs they belonged. None of the data saved on the computer was in danger.

After everything was stored safely on a tape, I still had a little more housekeeping to do. Once I removed the old hard drive, I would need a floppy disk to boot up the computer and some utility programs to help me install the new hard drive. Thinking ahead, I created a bootable disk and filled it with a text editor, a copy of Norton Disk Doctor, and a couple of other favorite utilities. If I had been half as clever as I thought, I would have remembered to include a copy of my tape backup program on the disk.

The Big Drive for the Drive

Early the next morning, I hopped into the car and took off for the local computer store. For you, that might be a five-minute trip to the corner and back. But we live in the mountains of New Mexico: A quick trip to town and back invariably

takes two hours or more. By 10:15, I was buying a 200MB IDE hard drive and adapter card. The salesman assured me that I had everything I needed to install the new drive. By 11:30, I was back home, ready to tame the beast.

Opening the computer was no problem. I removed a few screws on the back of the case, and the top slid off and out of the way. (By the way, when you do this, be sure the screws you loosen are the ones that hold the case together, not ones that keep other parts of the computer from rattling around. And don't lose the screws—you'll need them to put the computer back together. Invariably, at least one screw jumps away from your work table and hides in a corner. If you really can't find it, you can buy replacements, including plastic ones that you can install or remove with your fingers, at most computer stores.)

Removing the original hard drive was just as easy. On some computers the process can be a real chal-

lenge, because you may need to remove several other parts to get to the drive. But the job was simple on my wife's Gateway 2000 machine. I had to loosen a few screws and detach the cables from the back of the hard drive before I could slide it out.

I also removed the original disk controller card and all of the cables attached to it. Normally, one card controls both the floppy drives and hard drives, and sometimes even a backup tape drive. Some controllers also have parallel and serial input/output (I/O) ports, a game port, and anything else that the manufacturer can think of to add on (and increase the price and profit). IDE controllers, in particular, are so simple that manufacturers need to add something to justify a price over \$10.

LESSON 2:

Make sure the new disk will fit.

The old hard drive, a 160MB ESDI model, weighs about 15 pounds and is as large as two floppy drives. The new one, a 200MB IDE drive, is only slightly larger and heavier than a pocket organizer. If I had spent even a few seconds thinking about it, I would have realized that the new one would be too small for the bay that held the original drive. But I had been in a hurry.

As soon as I held the new drive up to the computer, I saw my mistake. So, I called the computer store and asked if they had an adapter kit to make the drive fit into my computer's 5.25-inch bay. "Oops," said the salesman, "We forgot to include that. Let me look... No, I don't have one in stock."

Three more phone calls, and I found a store that had the adapter kit. Back into the car and back to town to buy a \$4 kit. To avoid other problems, I took the new hard drive with me to make sure the kit would fit. By 4 P.M., I was back home again, adapter in hand.

It took only a few minutes to at-

TIP SORTING DIRECTORIES BY COMPRESSION RATIO

If you use DOS 6's DBLSPACE, you may use DIR's /O switch to sort files by compression ratio. The appropriate command is as follows:

```
DIR /O:C
```

This displays the files with the smallest compression ratios first. To list files with the highest ratios first, type this command:

```
DIR /O:-C
```

As with DIR /C, when you type DIR /O:C or DIR /O:-C, DOS displays compression ratios for all files in the directory, using a cluster size of 8K to calculate those ratios. If you want DIR to use the actual cluster size of DBLSPACE's host volume, use a /CH switch, as in this command:

```
DIR /O:C /CH
```

The listing produced when you type DIR /O:C or DIR /O:-C will contain subdirectories, but DOS omits them if you add the switch /A:-D:

```
DIR /O:C /A:-D
```

—Doug Lowe

HARD DRIVE REPLACEMENT TIPS

Despite my experiences, replacing a hard drive usually is fairly easy. Here are a few tips to make the experience as pleasant as possible.

If your computer is important to your business and you can't afford to have it out of commission, consider renting a replacement. Transfer everything from your hard drive to the replacement. (Use the DOS 6 InterLink utility or a commercial program such as Traveling Software's LapLink.) Make sure that the replacement computer runs exactly like your own machine by running your major applications and verifying that they can call their own data files. Then start the repair job. Once the new drive has been installed, you can use InterLink or LapLink again to move everything back to your computer.

Also, remember to make at least one, and perhaps several, bootable disks before you remove the old drive. At a minimum, you will need FDISK.EXE, FORMAT.COM, and your backup or data-transfer software on the floppy disks. Go through your utilities' directories and copy any that you think might help you.

Remove the old hard drive and controller card and take them with you when you go to purchase the new drive and card. Have the salesperson attach the adapter kit for you, or borrow a screwdriver and do it while you stand there. Do the

same for the rails. Unless you are shopping on a weekend afternoon, you should find the salespeople anxious to help you and close the sale.

When you are satisfied that the new drive will fit into the space the old drive used to occupy, turn your attention to the cables and the new controller card. Let the sales staff help you set the jumpers and determine which way the cables should be attached to the card and the drive. Also, make sure that you get the setup parameters for the new drive.

If you are brave, you can update your DOS version or important applications at the same time you install the new hard drive. However, don't make too many changes at once, or you may have a difficult time determining why an application fails to run correctly. It is better to make one change at a time and test the results of each.

Finally, don't panic when something goes wrong. If you get frustrated, you may want to kick the computer or bang on the monitor—neither of which will help fix the problem. But if you let yourself think for a few minutes, you'll discover that you can fix almost any problem your computer throws your way.

—H.B.

tach the kit to the hard drive. The kit is essentially a pair of U-shaped metal channels that fit on each side of the drive to make it as wide as a standard floppy disk drive. Once I attached the adapter to the drive, using the included screws, I had to put rails on the adapter. The rails, which vary by computer manufacturer, hold a drive or other device in a bay by sliding in metal slots. I removed the rails from the old drive and tried to attach them on the adapter.

LESSON 3:

Make sure the screws will fit.

The computer industry has never agreed on standard screw sizes and types. The old drive's rails were held in place with SAE (American/British) machine screws, and the new adapters were tapped for metric screws. About this time, the cats decided to leave home for a day or two, while I debated whether to re-tap the holes in the adapter, find some metric machine

screws, or drop-kick the adapter into the next county.

I jumped back in the car again, and this time drove to a hardware store that is only 20 minutes away. I arrived there just before they closed at 6:30 P.M. Luckily, they had the metric machine screws I needed.

By early evening, the hard drive was nestled in its bay. It would be only a few minutes before the IDE adapter card would be snuggled into its slot inside the computer. The card I bought came with three I/O ports as an added attraction. I hadn't wanted them, but it was the only adapter the computer store had in stock.

I disabled the ports by following the instructions supplied with the adapter. Fortunately, the instructions were written in a language similar to English, and the diagrams were only a little bit blurry. After 15 minutes, I had found and moved the necessary jumpers (those little plastic and metal connectors that fit over metal pins) to

set up the board for my wife's computer.

LESSON 4:

Parts designed to fit, usually don't.

Next, I tried to slide the adapter into the slot on the computer's motherboard. Guess what? It wouldn't fit. My wife went out for a leisurely supper with friends; the dogs disappeared behind a tree in the backyard.

After some time, I realized I could take the back plate off the card, remove a thin cosmetic insulator that surrounded the parallel and serial ports, reattach the back plate, and have just enough clearance to get the board into its slot. It worked! It was still a tight fit, but I managed to place the card into its slot without breaking it in half.

Attaching the power cables to the floppy disks and the new hard drive was easy. So was attaching the data cables to each. But the instructions didn't give me a clue about which way the cables should

have attached to the adapter board.

When a cable is attached upside down, the drive light and motor come on as soon as the computer is turned on, but nothing else seems to happen. I attached both cables upside down at first, defying the odds of getting at least one right. (If you do the same, just be sure to turn off the computer's power switch as quickly as possible, once you realize your mistake. The drive could get damaged if you don't.)

By 8:30 P.M., I could turn on the computer and start up using the bootup disk I had created earlier. I had managed to complete a 30-minute disk drive replacement in just over 12 hours!

LESSON 5:

Be sure your instructions include the drive's parameter settings.

At this point, I figured the most troublesome work was behind me. Wrong again! Once the hard drive

was nestled inside the computer with the proper cables attached, I had to set it up and get it to work.

Three steps are involved in setting up a new IDE hard drive: First, you must run the computer's setup program to define the drive's parameters. Next, you have to run FDISK.EXE, a DOS utility that creates one or more partitions on the disk. Finally, you have to run the DOS FORMAT program to prepare the disk for use.

In the setup program, you must define the hard drive's parameters—the number of sectors, cylinders, and heads—so the computer's Basic Input/Output System (BIOS) knows how to interact with the drive. You can choose from several pre-defined hard drive types or pick a user-defined hard drive and key in the parameters.

For most new drives, you'll have to choose the user-defined entries, because the pre-defined types tend to be outdated and relatively small-

capacity drives. An instruction sheet that tells which parameters to use should come with the drive, or you can get that information from your dealer. Of course, no such data sheet was included with my new drive, and the dealer was closed for the evening.

Fortunately, IDE drives aren't picky. In fact, you can set almost any combination of heads, cylinders, and sectors that add up to the drive's total capacity. The drive then translates the numbers to suit itself. After a bit of experimenting, I found settings that worked for my model.

Each time I changed the settings, I rebooted the computer. I had included two essential DOS utilities on the bootup disk: FDISK.EXE and FORMAT.COM. With FDISK, I could create a single partition on the drive. Then I had to reboot again and format the hard drive.

Once the format was done, I could see how much space the BIOS and DOS had found on the hard drive. Sometimes the number was too low. Other times, I had specified too large a disk in setup, and the whole computer stopped when FORMAT tried to access sectors that weren't there. Finally, I got the settings right.

It was 10:30 P.M. I ran Norton Disk Doctor to look for any flawed sectors on the new drive. It found a few, but not enough to worry about. Then I started SpinRite II to do a thorough scan of the new disk while I collapsed in bed.

LESSON 6:

Don't forget to back up your backup program.

The next morning, SpinRite reported that the new drive was in good working order. All that was left was to load up the drive and, finally, I would be done.

My wife hadn't installed MS-DOS 6 yet, so the first thing I did was load it onto the hard drive using its own installation program.

TIP IMPROVING ON BACKUP AND RESTORE

BACKUP and RESTORE (DOS 5 and earlier) are handy utilities. They are the only DOS commands that let you back up a file that won't fit on one floppy disk. They also let you use nearly every byte of space on your backup disks, which is unlike XCOPY, a command that wastes space when a file doesn't quite fit on the disk. BACKUP and RESTORE have several drawbacks, though. One of the most important is that they don't let you restore a file into a directory other than the one from which it was backed up. In other words, if you use the command `BACKUP C:\WP B: /S` to save copies of your files, you may restore the backup files only to \WP. This presents a problem if, for example, a friend gives you a backup of his \GAMES directory, and you don't want to overwrite your \GAMES directory.

Fortunately, DOS offers a solution in the form of a file called CONTROL, which it places on each backup disk. This file contains all the information about every file and directory stored on the backup disk, except for the data itself. The names of files are preceded by a double quotation mark (") and the names of directories are preceded by an uppercase F. You may type the command `ATTRIB CONTROL.* -R` to turn off the read-only bit on the control file; then you may use a file editor that has a hexadecimal mode (the file editing function of Symantec's Norton Disk Doctor works well), which modifies the names of these directories and forces RESTORE to put the files wherever you choose. Remember that the directory name may appear in two or more CONTROL files if you have two or more backup disks. You must change the directory name in each CONTROL file.

—David Oatley

And her copy of Stacker 3.1 (which is made specifically for DOS 6) had arrived just a few days earlier. Once DOS was loaded, I installed Stacker and smiled as it expanded the 200MB into 400MB.

Next, I grabbed the backup tape that contained everything from my wife's old drive. I put it in the tape drive and tried to change into the C:\TAPE directory. Of course, it wasn't there. I hadn't remembered to put her tape software onto the floppy disk either. If you want to feel really foolish, try holding a backup tape with all of your vital data except the program that can restore that data to your hard disk.

Luckily, we share one tape drive for our two computers, and I realized that I had the necessary software on my machine. Because my wife was using my computer to meet her deadline, I had to wait until she got to a stopping point, then I copied my tape software onto a floppy disk, carried it to her computer, and installed it there. In a few minutes, the tape drive was ready to load files onto the computer.

For reasons dating back to DOS 2.1, her 160MB hard drive had been partitioned into four logical drives. When I installed the new drive, I decided to move her system into the 1990s by creating a single partition. After some head-scratching, I figured out how to load all of her files into a single partition without destroying her directory structure or overwriting important files in the root directory.

By noon, I had moved all of the files onto her hard drive and installed new copies of the few files that had been lost as the old drive self-destructed. The hard drive had been restored. All that was left was to reboot.

LESSON 7:

Configuration files and Windows icons tend to disappear.

I almost cried as I watched the long list of error messages flash by

while DOS tried to process the CONFIG.SYS and AUTOEXEC.BAT files. I realized that I still had several hours of work left.

When I had changed the hard drive's organization, I had forgotten to change the drive and directory names of each of the programs mentioned in the configuration files. Of course, DOS couldn't find the programs until I told it where each one had been moved.

Fixing AUTOEXEC.BAT and CONFIG.SYS didn't take too long, although I had to search several directories for some programs. Then I rebooted the computer and started Windows 3.1.

You might have heard the groan as I realized virtually every program visible in the Program Manager, in addition to the programs defined in dozens of initialization files, had moved to a new drive or directory.

To solve this dilemma, first I used the Windows utility SYSEDIT.EXE to edit the WIN.INI and SYSTEM.INI files—both had many references to programs that had moved. Then, I spent a couple of hours redefining the properties of each Program Manager icon to point to a new drive and directory. As I changed each one, I also had to let the Program Manager look for the appropriate icon and add it to the correct program group. Finally, I had to edit about a dozen PIF files and batch files called by PIF files. The work was tedious, but not difficult.

Could I have forgotten anything else? Of course. Dozens of other INI files were in the Windows subdirectory. I used a powerful text editor to load them all at once and search for any mention of files on the drives that had been eliminated. More than 100 lines had to be changed.

When that was done, I left Windows and rebooted the computer, then launched Windows again to make sure that the computer read all of the changes I had made in the CONFIG.SYS and AUTOEXEC.BAT files, and also the dozens of INI files

I had edited. The machine booted up normally, and Windows started without a hitch.

Next, I tried to launch each program in the Windows Program Manager. Many seemed to work fine, but some icons were lost. The problem was that some had private INI files, or even files in proprietary formats, that pointed to their own auxiliary files. By the next morning, I was bleary-eyed, but most of the programs were up and running correctly.

In My Defense

You may think that I made every mistake possible during the installation of my new hard drive. Not quite. Some people attach the adapter kit or drive rails too tightly to the drive itself. This binds the hard drive and makes it report many more errors than it should. I knew enough to avoid that trap.

And, I don't think all the problems were my fault. The computer dealer should have asked me if I needed an adapter kit for the new drive (I told him I was replacing an old ESDI drive). He also should have given me the correct setup settings for the hard disk. And the adapter kit I bought should have come with screws for the drive rails. But they didn't, and I can blame myself for not thinking ahead. However, I don't think I can be blamed for an IDE adapter card that was mis-manufactured and was slightly too long to fit into the motherboard slot.

Despite all the hassles, our new hard drive works well. Although it isn't as fast as the old one, a disk cache program such as SMARTDRV keeps the computer running with few disk pauses. And it's nice to know that my wife's data is secure. As for the old drive, it's now a paperweight on one of the office desks. Most everything is back to normal. Even the cats have returned, although they still seem to shy away when I walk into the computer room. ■

WEIGHTS AND MEASURES

Convert-O-Matic

Any way you slice it, MEASURE.BAS makes quick work of transforming tons into kilograms, meters into nautical miles, and pounds into ounces.

by Antonio and Alfonso De Pasquale

Two cups equal a pint, and two pints equal a quart. So, four cups equal a quart. But how many cups are in a liter?

If you need to know such things, MEASURE.BAS can help. This QBasic program not only converts length, area, weight, liquid capacity, and dry capacity values from the U.S. system to metric and vice-versa, but it also converts values within the same system, changing feet into fathoms or square inches into square yards.

The program is easy to use and understand and, despite its wide-ranging conversion capabilities, relatively short. If you're a passable typist, you can have the program up and running in two or three hours. Or, to avoid typing, you can download MEASURE.BAS from *DOS Resource Guide's* bulletin board system (BBS). (Dial 1-603-924-3181 and follow the on-screen prompts.)

Free-lance writers and programmers Antonio and Alfonso De Pasquale are frequent contributors to DOS Resource Guide.

First Steps

To get started, first load QBasic by typing QBASIC at the DOS prompt. (You must provide a path if the directory in which you store QBasic isn't mentioned in your system's PATH statement.) Next, type in the commands shown in MEASURE.BAS. QBasic will flag your syntactical transgressions as you type in each line, which cuts down on typing errors that might cause the program to run improperly. (This works only if you have not turned off the syntax checking feature in QBasic's Options menu.)

To safeguard your work, save the listing to disk periodically. The first time you save, select the Save As option from the File menu and type MEASURE.BAS in response to the request for a filename; thereafter, you may choose the File menu's Save option to store an updated copy of the listing.

MEASURE.BAS relies on two short subprograms, BOX and CMENU, which you must type in separately. To create the first subprogram and link it to MEASURE.BAS, select the New SUB option from the Edit menu and name the subprogram.

(Be sure that MEASURE.BAS is loaded before you carry out the previous step.) QBasic starts you off by filling in the first part of the subprogram's first line and its last line. You type in everything in between. As you type, continue to save the listing periodically; QBasic will save the subprogram as well as the program proper. When you finish with BOX, create CMENU, following the same procedures that you used with BOX: Select the New SUB op-

How BASIC Can You Get?

We'd like to see the QBasic programs and procedures of which you're most proud. They must be 50 or fewer lines and accompanied by a brief explanation. Mail to:

**QBasic Submissions
DOS Resource Guide
80 Elm St.
Peterborough, NH 03458**

Or upload the files to our on-line addresses:

**CompuServe 75300,2361
MCI Mail 469-7260
DRG BBS 603-924-3181**

tion, name it, and begin typing. QBasic will add each subprogram's DECLARE statement to the main program whenever you choose the Save option.

To navigate among the program's three sections—to check and edit the commands they contain—press F2 and select the correct module. Or you may press Ctrl-F2 to move among the three modules' editing screens.

When you're ready for a test run, choose the Start option from the Run menu (or press Shift-F5). If all goes well, the screen will clear, and the main menu will display the following lines:

Please select one of the following:

- (1) For length conversions
 - (2) For area conversions
 - (3) For weight conversions
 - (4) For liquid capacity conversions
 - (5) For dry capacity conversions
- Type in your selection (or press Enter to quit)

When you type a number from 1 to 5 and press Enter, the screen clears, and a new menu consisting of three windows is drawn. The top left window displays the possible conversion factors. The second window, in the top right corner of the screen, prompts you for three pieces of information:

- the unit of weight or measurement—yards, pounds, square inches, and so on—from which you want to convert. (Type in a valid number and press Enter, or press Enter to return to the main menu.)
- the unit of weight or measurement—centimeters, grams, square meters, and so on—to which you want to convert. (Again, type in a valid number and press Enter, or press Enter alone to return to the main menu.)
- the value of the weight or measurement that you want to convert. (Type in the value and press Enter,

or press Enter to return to the main menu.)

After you provide the three items, the program displays your original value and its equivalent measurement or weight in the third window, at the bottom of the screen. (Numbers exceeding 999,999.99 will start with a meaningless percent symbol [%] that you can safely ignore.) You then may press Enter to perform another conversion.

The sidebar "When a Pound Is Not a Pound" provides useful background on the three standards on which the program's measurements are based.

How the Program Works

MEASURE.BAS begins by declaring two subprograms: BOX, which draws boxes, and CMENU, which displays menus for the various units of weight and measurement.

BOX is a subprogram that MEASURE.BAS uses to draw boxes.

```
SUB BOX (R1, C1, R2, C2)

    LOCATE R1, C1
    PRINT CHR$(218);
    FOR X = (C1 + 1) TO (C2 - 1)
        PRINT CHR$(196);
    NEXT X
    PRINT CHR$(191)

    FOR X = (R1 + 1) TO (R2 - 1)
        LOCATE X, C1
        PRINT CHR$(179); SPACE$(C2 - C1 - 1); CHR$(179)
    NEXT X

    LOCATE R2, C1
    PRINT CHR$(192);
    FOR X = (C1 + 1) TO (C2 - 1)
        PRINT CHR$(196);
    NEXT X
    PRINT CHR$(217)

END SUB
```

End

CMENU is a subprogram that MEASURE.BAS uses to center the text displayed in its menus.

```
SUB CMENU (M$, MAXVAL, V$())

    VPOS = 7
    LOCATE 5, 4
    PRINT M$
    FOR X = 1 TO MAXVAL
        LOCATE VPOS, 4
        PRINT USING "(##) - "; X;
        PRINT V$(X)
        VPOS = VPOS + 1
    NEXT X

END SUB
```

End

MEASURE.BAS lets you convert weights or measurements from the U.S. system to the metric system or vice versa. It also can convert values within each system, changing yards into inches, for example. (Note: You also must type in the BOX and CMENU program listings according to the instructions in the article. QBasic then will add the necessary DECLARE statements to the main program automatically when you choose the Save option in the File menu.)

```
'MEASURE.BAS
'by Antonio & Alfonso De Pasquale, 1993
'
FILLARRAYS:
    DIM LENGTH(10), AREA(7), WEIGHT(10),
        LIQUID(10), DRY(6)
    DIM LENGTH$(10), AREA$(7), WEIGHT$(10),
        LIQUID$(10), DRY$(6)
    DIM V$(10)

    FOR X = 1 TO 10: READ LENGTH(X): NEXT X
    FOR X = 1 TO 7: READ AREA(X): NEXT X
    FOR X = 1 TO 10: READ WEIGHT(X): NEXT X
    FOR X = 1 TO 10: READ LIQUID(X): NEXT X
    FOR X = 1 TO 6: READ DRY(X): NEXT X
    FOR X = 1 TO 10: READ LENGTH$(X): NEXT X
    FOR X = 1 TO 7: READ AREA$(X): NEXT X
    FOR X = 1 TO 10: READ WEIGHT$(X): NEXT X
    FOR X = 1 TO 10: READ LIQUID$(X): NEXT X
    FOR X = 1 TO 6: READ DRY$(X): NEXT X

MAINMENU:
DO
    CLS
    BOX 1, 21, 3, 57
    LOCATE 2, 25: PRINT "*** Measurement
        Converter ***"
    BOX 5, 5, 15, 75
    LOCATE 6, 10: PRINT "Please select one of
        the following:"
    LOCATE 8, 10: PRINT "(1) For length
        conversions"
    LOCATE 9, 10: PRINT "(2) For area
        conversions"
    LOCATE 10, 10: PRINT "(3) For weight
        conversions"
    LOCATE 11, 10: PRINT "(4) For liquid
        capacity conversions"
    LOCATE 12, 10: PRINT "(5) For dry
        capacity conversions"
    LOCATE 14, 10: INPUT "Type in your selection
        (or press Enter to quit): ", SEL$
    SEL = VAL(SEL$): IF SEL > 0 AND SEL < 6
        THEN GOSUB CONVERTMENU
    LOOP UNTIL SEL = 0
    CLS
END
```

CONVERTMENU:

```
DO
    GOSUB CLEARSCREEN
    BOX 4, 1, 18, 34: BOX 4, 35, 18, 79: BOX
        19, 1, 23, 79
    LOCATE 5, 3
    SELECT CASE SEL
    CASE 1
        M$ = "Length Conversions"
        MAXVAL = 10
        FOR X = 1 TO MAXVAL: V$(X) =
            LENGTH$(X): NEXT X
    CASE 2
        M$ = "Area Conversions"
        MAXVAL = 7
        FOR X = 1 TO MAXVAL: V$(X) =
            AREA$(X): NEXT X
    CASE 3
        M$ = "Weight Conversions"
        MAXVAL = 10
        FOR X = 1 TO MAXVAL: V$(X) =
            WEIGHT$(X): NEXT X
    CASE 4
        M$ = "Liquid Capacity Conversions"
        MAXVAL = 10
        FOR X = 1 TO MAXVAL: V$(X) =
            LIQUID$(X): NEXT X
    CASE 5
        M$ = "Dry Capacity Conversions"
        MAXVAL = 6
        FOR X = 1 TO MAXVAL: V$(X) =
            DRY$(X): NEXT X
    END SELECT
    CMENU M$, MAXVAL, V$( )
    GOSUB ENTRY
    LOOP UNTIL UNIT1 = 0 OR UNIT2 = 0 OR NUM = 0
    RETURN

ENTRY:
    GOSUB GETFROM: IF UNIT1 = 0 THEN RETURN
    GOSUB GETTO: IF UNIT2 = 0 THEN RETURN
    GOSUB GETVALUE: IF NUM = 0 THEN RETURN
    GOSUB CONVERTVALUE
    RETURN

GETFROM:
    X$ = SPACE$(15)
    LOCATE 7, 37: PRINT "Select the unit you wish
        to convert FROM"
    LOCATE 8, 37: INPUT "Selection: ", X$
```



```

X = VAL(X$): IF X < 0 OR X > MAXVAL THEN GOTO
GETFROM
UNIT1 = X
RETURN

```

GETTO:

```

X$ = SPACE$(15)
LOCATE 10, 37: PRINT "Select the unit you
wish to convert TO"
LOCATE 11, 37: INPUT "Selection: ", X$
X = VAL(X$): IF X < 0 OR X > MAXVAL THEN GOTO
GETTO
UNIT2 = X
RETURN

```

GETVALUE:

```

X$ = SPACE$(15)
LOCATE 13, 37: PRINT "Type the value to
convert. (Press Enter to cancel.)"
LOCATE 14, 37: INPUT "Value: ", X$
X = VAL(X$): X = INT((X + .005) * 100) / 100
LOCATE 14, 43: PRINT X; SPACE$(5)
MAXVAL = 99999: IF X < 0 OR X > MAXVAL THEN
GOTO GETVALUE
NUM = X
RETURN

```

CONVERTVALUE:

```

SELECT CASE SEL
CASE 1
CNVAL = NUM * LENGTH(UNIT1) /
LENGTH(UNIT2)
M1$ = LENGTH$(UNIT1)
M2$ = LENGTH$(UNIT2)
CASE 2
CNVAL = NUM * AREA(UNIT1) / AREA(UNIT2)
M1$ = AREA$(UNIT1)
M2$ = AREA$(UNIT2)
CASE 3
CNVAL = NUM * WEIGHT(UNIT1) /
WEIGHT(UNIT2)
M1$ = WEIGHT$(UNIT1)
M2$ = WEIGHT$(UNIT2)
CASE 4
CNVAL = NUM * LIQUID(UNIT1) /
LIQUID(UNIT2)
M1$ = LIQUID$(UNIT1)
M2$ = LIQUID$(UNIT2)
CASE 5
CNVAL = NUM * DRY(UNIT1) / DRY(UNIT2)
M1$ = DRY$(UNIT1)
M2$ = DRY$(UNIT2)
END SELECT

```

```

CNVAL = INT((CNVAL + .005) * 100) / 100
LOCATE 20, 5: PRINT USING "###,###.## "; NUM;
PRINT M1$; " is equal to ";
PRINT USING "###,###.## "; CNVAL;
PRINT M2$
LOCATE 22, 25: PRINT "*** Press Enter to
continue ***"
DO UNTIL INKEY$ = CHR$(13): LOOP
RETURN

```

CLEARSCREEN:

```

FOR X = 4 TO 23: LOCATE X, 1: PRINT
SPACE$(79): NEXT X
RETURN

```

DATASECTION:

```

DATA .3937, 1, 12, 36, 39.37, 72, 39370,
63360, 71013.24, 190080
DATA .1550003, 1, 144, 1296, 1550.003,
4014489600, 6272640
DATA .01543236, 1, 3.086, 15.43236, 437.5,
480, 7000, 5760, 15432.36, 11520000
DATA 1, 1.333333, 4, 8, 64, 128, 256,
270.51218, 1024, 7660.052
DATA .0297616, 1, 1.816166, 2, 16, 64

DATA "Centimeters", "Inches", "Feet",
"Yards", "Meters", "Fathoms"
DATA "Kilometers", "Statute Miles", "Nautical
Miles", "Leagues"

DATA "Square Centimeters", "Square Inches",
"Square Feet", "Square Yards"
DATA "Square Meters", "Square Miles", "Acres"

DATA "Milligrams", "Grains", "Carats",
"Grams", "Ounces (Avoirdupois)"
DATA "Ounces (Troy)", "Pounds (Avoirdupois)",
"Pounds (Troy)"
DATA "Kilograms", "Tons"

DATA "Drams", "Teaspoons", "Tablespoons",
"Fluid Ounces", "Cups", "Pints"
DATA "Quarts", "Liters", "Gallons", "Cubic
Feet"

DATA "Cubic Inches", "Pints", "Liters",
"Quarts", "Pecks", "Bushels"

```

End

WHEN A POUND IS NOT A POUND

If you were taught the old maxim, "A pint's a pound the world around," it may surprise you to learn that that's true only some of the time. The United States system of weights and measures offers three variations: Avoirdupois (pronounced AV-er-da-POYZ), Troy, and Apothecaries'. The Avoirdupois system is based on a pound containing 16 ounces or 7,000 grains; one pound weighs 453.59 grams. In the Troy system, a pound contains 12 ounces or 5,760 grains and weighs 373 grams. In the Apothecaries' system, which includes a number of specialized weight units, a pound contains 12 ounces or 5,760 grains and weighs 373 grams.

MEASURE.BAS performs conversions for both the Avoirdupois and Troy systems. Because some of the measures in the Apothecaries' system are the same as those for the Troy system, MEASURE.BAS also can perform some conversions for this system.

—Marilyn McMaster

Control then passes to the `FILL-ARRAYS` section, which creates the arrays that the program uses to store conversion factors and text labels. A series of `FOR...NEXT` statements reads into the arrays the information from the `DATA` statements in `DATASECTION`.

After completing this preliminary work, MEASURE.BAS executes the `MAINMENU` section, a `DO...LOOP` structure that draws the opening menu, prompts the user for a valid choice, and calls the `CONVERTMENU` subroutine (see the sidebar "Sub-

programs Versus Subroutines" for an explanation of the differences between these two types of program structures). If you press Enter by itself, `MAINMENU` clears the screen, and the program ends.

When you give MEASURE.BAS the three bits of information it needs to perform a conversion, control passes to `CONVERTMENU`, another `DO...LOOP` structure, which begins by invoking the subroutine `CLEARSCREEN`. As its name suggests, this routine clears a portion of the screen. `CONVERTMENU` then splits the screen into three

windows and displays the proper conversion menu.

Next, the routine calls the `ENTRY` subroutine, which retrieves your input using `GETFROM`, `GETTO`, and `GETVALUE`. `GETFROM` prompts you to provide a starting factor, `GETTO` prompts you for the factor to convert to, and `GETVALUE` prompts you for the value you want to convert. Note that `GETVALUE` rounds its input to two decimal places.

That work complete, `ENTRY` calls another subroutine, `CONVERTVALUE`, which performs the actual conversion, formats the numbers, and displays the original and converted values on the screen. When you press Enter in response to the prompt, you are given the opportunity to perform another conversion or exit the program. MEASURE.BAS keeps working for as long as you have conversions to feed it.

The program isn't fancy, but that may be its biggest asset. Its straightforward menuing system tells you exactly what your choices are. You supply the starting unit, the ending unit, and the starting value; MEASURE.BAS takes care of the math—down to the decimal point. ■

SUBPROGRAMS VERSUS SUBROUTINES

MEASURE.BAS extensively employs both subprograms and subroutines, two distinct QBasic programming structures. You may be wondering what the differences are between the two and when to choose one over the other.

Subprograms are pieces of programming code that you can use in more than one application. For example, the `BOX` subprogram in MEASURE.BAS is a generic procedure that easily can be applied to different programming situations. Another example of a generic, reusable subprogram would be a routine that centers text on a page or screen.

When using subprograms, you must first "declare" them within the body of the main program by using the `DECLARE SUB` statement. (Actually, when you save the listing, QBasic recognizes subprogram code and inserts the necessary `DECLARE` statement at the beginning of the main program.) The `DECLARE SUB` statement makes the main program aware of a subprogram's presence. When declaring a subprogram, you must specify any variables that will be passed to it within parentheses at the tail end of the `DECLARE SUB` statement. For example, `BOX` has four variables passed to it (`r1`,

`c1`, `r2`, `c2`). The subprogram uses the values of these four variables to determine the top left and bottom right coordinates of the box to be drawn. The following QBasic statement declares the `BOX` subprogram in MEASURE.BAS:

```
DECLARE SUB BOX (r1, c1, r2, c2)
```

Subroutines, by comparison, are sections of programming code that perform a specific task that is useful only in the current application. Thus, they do not warrant being written as individual subprograms.

For example, the `GETFROM`, `GETTO`, and `GETVALUE` subroutines in MEASURE.BAS perform highly specific functions that are unique to the program; they would not be especially useful in another application. As such, they have been integrated as subroutines into the main program.

Subroutines are called with the `GOSUB` command. When the routine finishes executing, a `RETURN` statement sends control back to the main section of the program.

—A.D. and A.D.

ASSEMBLY LANGUAGE: PART I

Supercharge Your QBasic Programs

If your programs are sluggish or can't do what needs doing, perhaps it's time to rev them up with an assembly language routine.

by Phil Weber

QBasic is an amazing bargain. An updated version of an easy-to-learn classic, QBasic offers modern features, such as TYPE...END TYPE and DO...LOOP, in a fast, interpreted-language environment—and it's included free with every copy of MS-DOS 5 and later! For all its power, though, QBasic has its share of limitations. How, for example, do you read a list of file or directory names from a disk, or create mouse-aware programs?

The solution is to write routines in assembly language. To some, that prospect might sound daunting, but it's simpler than you think. This straightforward introduction to adding assembly language to QBasic explains the general procedures, providing several practical examples that you can incorporate into your existing programs.

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What Is Assembly Language?

As you probably know, your computer doesn't understand English commands such as PRINT and OPEN. QBasic's job is to translate these high-level commands into lower-level instructions the microprocessor can execute directly. These instructions are known as assembly language. A single line in a QBasic program may end up as dozens (or even hundreds) of assembly language statements.

Each assembly language instruction is represented in memory as a numeric code. The sequence 205, 33, for example, tells the processor to call one of the built-in services provided by DOS. When you learn the various assembly language commands and their corresponding codes, you will be able to string a series of them into an assembly language program and tell QBasic to run it.

Creating programs out of a bunch of numbers might sound like a lot of trouble, but consider the benefit: speed—lots of it! Just for laughs, I wrote a QBasic subprogram that saves a portion of the video display to an array. You

might use such a routine to save the screen before popping up a window, so that you can restore the underlying image later. The program SCRNSAVE.BAS (see listing) takes just over 3 minutes to save the screen 100 times. An equivalent routine in assembly language performs the same task in only .22 seconds!

In addition, DOS and your computer's hardware have scores of useful functions built in—among them, file and directory services, mouse support, and low-level keyboard and video control (see the sidebar "Allow Me to Interrupt..."). Assembly language lets your QBasic programs access these ready-made routines, called interrupt services, making your programs more polished and powerful than ever before.

The QBasic/Assembly Language Interface

The key that unlocks the power of assembly language is QBasic's CALL ABSOLUTE statement. Just as GOSUB directs a program's execution to a particular subroutine, CALL ABSOLUTE tells QBasic to go to a spe-

ALLOW ME TO INTERRUPT...

Quick: Think of the last program you used that didn't access the disk, read from the keyboard, or write to the screen. The fact is, nearly all programs have at least these basic functions in common.

The PC's designers foresaw that this would be the case, so they bundled a set of often-used routines within the operating system and the standard Basic Input/Output System (BIOS). DOS programs—including the assembly language routines that are in the main article—take advantage of these built-in functions by means of interrupts.

There are actually two kinds of interrupts in the DOS world: hardware and software. Hardware interrupts occur in response

to external events, such as keystrokes and mouse movements. Software interrupts, on the other hand, may be called on demand like any other subroutine: A program simply indicates which function it desires (by placing values in special memory areas called registers) and then issues an INT command. Generally speaking, DOS interrupts provide file and directory services, while BIOS interrupts focus on I/O issues: the keyboard, mouse, screen, and ports. The various interrupt services, and the parameters needed to call them, are widely documented. My favorite reference is Peter Norton's *PC Programmer's Bible* (Microsoft Press).

—P.W.

cific location in memory and execute the instructions that are residing there.

Generally, the code for an assembly language routine is stored in a QBasic variable. You might choose to include the numeric instruction codes in DATA statements and use QBasic's READ command to place them in a variable, as I've done in the accompanying examples. Or, to conserve data space, you might save the assembler code in a disk file and read its contents into a variable when you run your QBasic program. In either case, you will end up with a variable that contains the code for your assembly language routine.

How, though, do you specify the location of this variable to CALL ABSOLUTE? As you may know, DOS manages your PC's memory as a series of segments, each of which may be as large as 64K. You can pinpoint any byte in memory by specifying its segment and a location within that segment, called an offset.

Conveniently, QBasic includes functions that return the segment and offset of any variable: VARSEG (for *variable segment*) returns the segment address of any variable, VARPTR (for *variable pointer*) returns the offset of a numeric variable, and SADD (for *string address*) returns the offset of a string variable.

Suppose, for example, that you placed your assembly language routine in an integer array called ARRAY%(). (Think of an array as a matrix of cells that you subsequently fill with values.) When you're ready to call the routine, you execute the following QBasic instructions:

```
DEF SEG = VARSEG(ARRAY%(1))
ADDRESS% = VARPTR(ARRAY%(1))
CALL ABSOLUTE(ADDRESS%)
```

If your assembly language routine requires that you pass it a parameter—a variable that the routine needs to operate correctly—the parameter must precede the name of the routine you are calling. A

SCRNSAVE.BAS is a QBasic program that saves a screen image to an integer array. It runs over 800 times more slowly than its assembly language counterpart.

```
DEFINT A-Z

REDIM SCRN(1 TO 2000)
CLS : COLOR 15, 1
PRINT STRING$(2000, 176);
START! = TIMER
FOR I = 1 TO 100
    CALL SCRNSAVE(SCRN(), 1, 1, 25, 80)
NEXT
ELAPSED! = TIMER - START!
PRINT USING "Elapsed time: ###.## seconds."; ELAPSED!

SUB SCRNSAVE (ARRAY(), ULR, ULC, LRR, LRC)

    ELEMENT = 1
    ROWS = (LRR - ULR) + 1
    COLS = (LRC - ULC) + 1
    FOR I = 1 TO ROWS
        FOR J = 1 TO COLS
            TEMP& = SCREEN(I, J) + (SCREEN(I, J, 1) * 256&)
            IF (TEMP& AND &H8000) THEN TEMP& = TEMP& - 65536
            ARRAY(ELEMENT) = TEMP&
            ELEMENT = ELEMENT + 1
        NEXT J
    NEXT I
END SUB
```

End

comma must follow each parameter, as in this example:

```
CALL ABSOLUTE(VERSION, ADDRESS%)
```

Because QBasic manages string variables differently than it does numeric variables, you must use SADD, rather than VARPTR, to return the address of a string variable. This approach works just as efficiently as the array method demonstrated above, except that strings are stored in QBasic's default data segment, which can hold a maximum of 64K.

Because of the space limitation, I have chosen to use dynamic arrays in this article. Dynamic numeric arrays (expandable arrays that you define using a REDIM statement) are placed outside QBasic's default 64K data segment, so you don't have to worry about running out of space if you use REDIM to create, or dimension, an array.

Determining the DOS Version

Now that you have a grasp of what assembly language is and how you might be able to put it to work in your own QBasic programs, I'd like to introduce a couple of practical examples.

It often is useful for a DOS program to know the version of the operating system under which it's running. This lets you, for instance, create network-aware programs that run without error on versions of DOS prior to 3.0. The program in the listing for DOSVER.BAS calls DOS interrupt 33, function 48, to determine DOS's version number.

The program begins by creating an array for DOSVER%() that will hold the assembly language code. Because the assembly language routine will contain 25 bytes and each element of an integer array accommodates two bytes, the array is dimensioned to 13 elements $((25/2) + 1)$. Under integer division ($\backslash$), the result of dividing 2 into 25 is 12, which means you

DOSVER.BAS reports the version of DOS under which it's running. The DATA items correspond to the assembly language instructions to their right. (The colons before the single quote marks are included to signal the end of the DATA statements. This prevents QBasic from trying to interpret the remarks as data items.)

```
DEFINT A-Z
REDIM DosVer(1 TO 13)           'Create a code buffer.
DEF SEG = VARSEG(DosVer(1))     'Point to buffer segment
ADDRESS = VARPTR(DosVer(1))     ' and offset.
FOR I = 0 TO 24                 'Read DOSVER's code into
    READ A                      ' buffer.
    POKE ADDRESS + I, A
NEXT: CLS                      'Call DOSVER and print
CALL ABSOLUTE(VERSION, ADDRESS) ' the results.
PRINT USING "DOS Version = ###"; VERSION / 100
END

DATA 139,220 : 'MOV BX,SP
DATA 139,119,4 : 'MOV SI,[BX+4]
DATA 180,48 : 'MOV AH,48
DATA 205,33 : 'INT 33
DATA 50,255 : 'XOR BH,BH
DATA 138,220 : 'MOV BL,AH
DATA 152 : 'CBW
DATA 177,100 : 'MOV CL,100
DATA 246,225 : 'MUL CL
DATA 3,195 : 'ADD AX,BX
DATA 137,4 : 'MOV [SI],AX
DATA 202,2,0 : 'RET 2
```

End

must add 1 to ensure that you can accommodate all 25 data items. Note that because DOSVER%() is created with the REDIM command, QBasic places it outside the default data segment.

Next, the program uses VARSEG and VARPTR to locate the beginning of the array DOSVER%(). Once the program knows where the array begins, a FOR...NEXT loop reads the program bytes from the DATA statements and pokes them into successive memory locations within the array. All that remains is to call the routine. In addition to the location of the routine (ADDRESS%), the program must pass a variable in which to return the result. This variable, VERSION%, precedes ADDRESS% in the CALL ABSOLUTE parameter list.

The assembly language routine returns the DOS version number times 100, so VERSION% will contain

330 for version 3.30, or 500 for DOS 5.00. The PRINT USING line at the end of the program simply divides VERSION% by 100 and then prints the result to two decimal places.

Because this example is short and relatively simple, I've opted to save DOSVER%()'s location at the beginning of the program and use it for the CALL ABSOLUTE statement later. In a more complex application, however, QBasic may rearrange items in memory, so the address originally reported for DOSVER%() may no longer be valid. For this reason, it's a good idea to use VARSEG and VARPTR (or SADD) immediately before you use CALL ABSOLUTE. If you wish, you may invoke VARPTR within the CALL ABSOLUTE line itself:

```
DEF SEG = VARSEG(ARRAY%(1))
CALL ABSOLUTE (VARPTR(ARRAY%(1)))
```


Testing for a File's Existence

QBasic provides two generally accepted ways to see if a file exists. The first is to set up an error-handling routine (with `ON ERROR GOTO`) and to trap error number 53, "File not found." The other is to open the file in random or binary mode; if the file didn't exist previously, the `OPEN` command creates an empty file. In subsequent lines of the program, you can check the file's length, inform the user that the file doesn't exist if its length is zero, and proceed accordingly.

Both of these methods are cumbersome and rather inelegant. Wouldn't it be nice if QBasic had

an `EXIST` function that could check for a file's existence before attempting to open it? Now, thanks to assembly language, it does.

The program listing for `EXIST.BAS` (below) calls DOS interrupt 33, function 78 to determine whether a file matching a given specification exists. This example is only slightly more complex than the first, and it follows the same general procedures:

- It creates a buffer for the assembly routine.
- It finds the location of the buffer in memory.
- It reads the code into the buffer.

EXIST.BAS eliminates run-time errors by letting you check for a file's existence before you try to open it.

```

DEFINT A-Z
REDIM EXIST(1 TO 17)           'Create a code buffer.
DEF SEG = VARSEG(EXIST(1))     'Point to buffer segment
ADDRESS = VARPTR(EXIST(1))    ' and offset.
FOR I = 0 TO 33                'Read EXIST code into
    READ A                     ' buffer.
    POKE ADDRESS + I, A
NEXT
LINE INPUT "Enter a file spec: "; FILESPEC$
IF LEN(FILESPEC$) THEN         'If the user entered something...
    TEMP$ = FILESPEC$ + CHR$(0) 'Tack on a null byte for DOS,
    CALL ABSOLUTE(EXIST, TEMP$, ADDRESS) 'and call the routine.
    PRINT FILESPEC$;
    IF EXIST THEN               'EXIST% = -1 if the file
        PRINT " exists!"       ' spec is found.
    ELSE                        'Otherwise, EXIST% = zero.
        PRINT " not found."
    END IF
END IF
END

DATA 139,220 : 'MOV BX,SP
DATA 139,127,6 : 'MOV DI,WORD PTR [BX+6]
DATA 139,119,4 : 'MOV SI,WORD PTR [BX+4]
DATA 70 : 'INC SI
DATA 70 : 'INC SI
DATA 139,20 : 'MOV DX,WORD PTR [SI]
DATA 184,0,78 : 'MOV AX,4E00 hex
DATA 51,201 : 'XOR CX,CX
DATA 205,33 : 'INT 33
DATA 199,5,255,255 : 'MOV WORD PTR [DI],-1
DATA 60,0 : 'CMP AL,0
DATA 116,4 : 'JZ EXIT
DATA 199,5,0,0 : 'MOV WORD PTR [DI],0
DATA 202,4,0 : 'EXIT:
: 'RET 4

```

End

- It invokes `CALL ABSOLUTE`.

After copying the assembly language code into the array `EXIST%`, the program prompts the user to enter a file specification for which to search. This specification may contain a path and wildcards. Notice that the program appends a null character (`CHR$(0)`) to the specification. Most DOS services that accept string parameters require that the string end with a null byte; this provides DOS with a means of calculating the length of the string.

This time, two parameters precede `ADDRESS%` in the `CALL ABSOLUTE` line: `TEMP$`, which contains the file specification (with a null byte added), and the integer variable `EXIST%`, which reports the result of the search. `EXIST%` returns a -1 if the file spec is found and a zero if none is found.

There's More Where These Came From

This primer on assembly language in QBasic barely scratches the surface of possible applications. You don't have to look far to find further opportunities to apply assembly language. As I mentioned at the outset, you can write routines to add advanced keyboard and video features and even mouse support to QBasic programs!

However, if you think stringing together sequences of numeric codes sounds too tedious, you might be relieved to know that you do have an alternative. Both Microsoft's Macro Assembler and Borland's Turbo Assembler are worthwhile investments if you envision a lot of assembly language in your future. I employed Microsoft's assembler and CodeView debugger to prepare the code for this article.

In Part II, I'll conclude by explaining DOS interrupts in greater detail, and I'll provide a listing that gives QBasic the ability to access interrupts more efficiently. ■

H A R D W A R E U P D A T E

486 Power for The Rest of Us

by Stan Miastkowski

Do you feel neglected? Left out? Puttering along with the PC equivalent of a Volkswagen Bug, while your coworkers, friends, and maybe even your children are zooming past you with their hot, Lamborghini-like 486s? Well, instead of just sulking or dropping a bundle for a computing speedster of your very own, consider super-charging your "old" 286, 386, or even 486SX system.

As I've explained in previous columns, there are plenty of ways to boost the performance and usability of your existing system. A hard disk is a great place to start.

But you'll gain the most dramatic performance improvements by replacing the "engine" that drives your system—namely, the microprocessor.

These days, installing a new processor is a relatively simple operation, and it's surprisingly affordable. I juiced up my 386/25 system to the equivalent of a 486/50, for less than \$400, and many other 286 and 386 processor upgrades come even cheaper. (Unfortunately, if your PC uses an 8088 processor, you're out of luck; such upgrades used to be available, but the market for them has become too small.)

As always, before jumping into such an endeavor, you need to weigh a number of considerations. In short order, I'll describe the pros and cons of processor upgrades, mention a few outstanding products, and talk about the costs in terms of time and money.

486 Racing Stripes

Processor upgrades come in a variety of forms. But no matter which you choose, the result is a system running some flavor of a 486 microprocessor. The reasons for this are good ones: The 486 design is fast

and efficient, and it has an on-chip cache—an area of super-fast memory where certain operations can be performed more quickly and effectively. Not unlike a software caching utility, the on-chip variety speeds up data processing. Some upgrade options also offer clock doubling, which essentially lets the new microprocessor run twice as fast as the original one.

(You'll find one exception to the 486-only rule: A company called SuperComputers offers a 25MHz 386SX-based upgrade designed only for the original Compaq Deskpro and AST Premium/286. This product essentially replaces

most of the components on the computer motherboard, including memory. Prices range from \$299 to \$698.)

If you're upgrading a 286-based system, most 486 processor upgrades are credit card-size circuit boards that plug into the socket where the current 286 resides. You can't just plug in a new chip, however. You have to remove the existing processor, and upgrade kits come with special tools for doing this.

The 286 also is physically smaller, and it carries a much different circuit-pin design from a 386 or 486. Further complicating the situation is that several different types of 286 sockets exist. All upgrade kits come with everything you need to make a connection, but you sometimes end up with an odd-looking stack of adapters.

Another type of processor upgrade is a circuit board that plugs into a standard, add-in slot in your PC. A ribbon cable then connects to the 286 socket. It looks odd, but it works.

If you're upgrading a 386-based system, your options expand and installation is much easier. 386SX computer users, however, will find far fewer choices

You'll gain the most dramatic performance improvements by replacing the "engine" that drives your system.

because of the unique way in which a 386SX chip is installed. More about that later. First, it's time to meet the major players.

Tiny Chips, Big Business

With one exception (see below), you won't find any processor upgrade options from Intel, the 500-pound gorilla of microprocessors. Back in 1981, IBM picked Intel's 8088 processor for its PC, sparking the personal computer revolution. The progression from the 8088 to 286, 386, 486, and Pentium has made Intel into a multibillion-dollar international behemoth. Big companies employ legions of lawyers, and Intel has spent years and millions of dollars attempting to squash its competitors.

The largest thorn in its side has been Cyrix, a small Dallas-based company that designs and sells Intel-compatible processors. The suits and countersuits between the two firms have been fierce and complex, and they continue. But Cyrix seems to be winning, and its 486-compatible designs have become the cornerstone of most processor upgrade options. (Cyrix also supplies chips to motherboard makers.)

The Texas Instruments 486DLC chip also is available in upgrade packages. The company licenses Cyrix's designs and manufactures chips for Cyrix. And, just to show you how strange this business is, the other popular upgrade chip is the IBM 486SLC, based on the Intel 486. Years ago, IBM licensed the 486 design from Intel, a decision that Intel may have

come to regret. IBM can't sell its chips directly, but it can sell them with its computers and to companies that make motherboards or upgrade boards.

ALL Computers of Toronto, Ontario, Canada, has been in the upgrade business the longest. For AT users, the company's current crop of upgrade options includes a selection that boosts virtually every 286-based system to a 25MHz, 33MHz, or 50MHz 486, using IBM's 486SLC chip on a small, plug-in circuit board. Prices range from \$299 to \$449. If you want to upgrade your existing 386DX (not SX) processor, ALL has three options ranging from \$249 to \$339. All the cards use the Texas Instruments DLC (Cyrix-designed) chip, and speeds up to 40MHz are available.

If your current computer is running a 386 processor, Cyrix offers perhaps the most intriguing upgrade option. Its new Cx486DRx2 single-chip upgrade almost instantly boosts your system to 486 power. Cyrix designed a 486 chip that's the same size and has the same pin design as the 386DX. A couple of years ago, the most popular PCs had 386DX chips running at 16MHz, 20MHz, or 25MHz, and these are the systems for which the Cyrix upgrade was developed.

Just purchase a Cx486DRx2 chip that matches your existing processor speed, remove the existing chip using an ingeniously clever tool, plug in the new chip, restart your

TIP ELIMINATING ENVIRONMENTAL DISASTERS

Ordinarily, I don't like to use environment variables in batch files. It seems that the minute I try to run such programs under a shell, I get an "Out of environment space" message. This means that the variables I need don't exist, and as a result, my batch file makes all the wrong decisions. (When insufficient environment space is available, DOS issues an error message, but it doesn't halt the batch file. If the batch file subsequently decides—based on what an environment variable contains—whether or not to delete a file, the results could prove disastrous.)

Occasionally, however, I can't avoid using environment variables. To handle such situations, I wrote the following batch-file fragment to test the environmental waters before a batch file runs. Here's how it works.

First, I decide how many bytes of space I need. (In this example, I chose 30 bytes, or 30 characters.) I place this number of characters after the equal sign in the SET TEST command in line 1. Line 2 checks to see if the variable TEST really does equal the string I assigned to it. If the test passes, ample room remains in the environment, and program control passes to the label :OK. The SET command in the next line clears out the environment space so that the subsequent lines can do their work. (You need to decide what that work will be.)

If insufficient space is available, line 3 displays an error message, and line 4 removes whatever remains of TEST from the environment. Line 5 ends the batch file.

—David Oatley

This batch-file fragment lets you test whether sufficient space is available to run a batch file that uses an environment variable.

```
1 SET TEST=123456789012345678901234567890
2 IF /%TEST%/==/123456789012345678901234567890/ GOTO OK
3 ECHO The environment doesn't have enough space for this
  batch file to run.
4 SET TEST=
5 GOTO End
6
7 :OK
8 SET TEST=
9 REM Include here the batch file lines that will
10 REM execute if sufficient environment space remains.
11 :End
```

End

system, run some software to enable the new chip's features, and reboot. All of the Cx486DRx2 chips are clock-doubled.

I upgraded an old Gateway 386/25 system using the Cyrix chip, and The Norton Utilities System Information utility informed me that I had a 486 system running at 50MHz. Prices range from \$399 to \$499, and a Cyrix spokesperson says a version for upgrading a 386/33 to a 486/66 should be available by the time you read this.

The 386SX Dilemma

One of the thorniest problems in processor upgrading is the 386SX chip, which is soldered directly to the motherboard. You can't remove it. At the time this article was written, Cyrix had built a prototype of a clever, clip-on processor upgrade designed specifically for 386SX-based systems. The new processor snaps onto the existing chip and makes contact with the pins. It takes advantage of the Cx486DRx2 chip as well as clock doubling for 16MHz, 20MHz, 25MHz, and 33MHz 386SX-based systems. Pricing wasn't available at press time, but the processor should cost about as much as the company's 486DX-upgrade products. For the time being, it looks to be the only upgrade option available for 386SX-based systems.

Buffalo Products is another firm offering a dozen different Power Kits for virtually all flavors of 286- and 386DX-based (again, not 386SX) systems. All are based on the Cyrix-designed, Texas Instruments-built 486DLC chip. Speeds vary, and clock-doubling chips are available. Prices range from \$199 to \$375.

Finally, 486SX users can opt for one of Intel's OverDrive Processors. These are intended to turn a PC that runs the Intel 486SX/25 or 33MHz model into a full-fledged, clock-doubled 50MHz or 66MHz 486 with a built-in math coprocessor. Using these upgrades requires that the motherboard have a special OverDrive socket, as do virtually all 486SX-based systems. It's an expensive option—priced from \$599 to \$799. The OverDrive chip is a full-fledged processor, however, that works by itself in the motherboard by turning off the original 486SX chip. Clever...and sneaky.

Do-It-Yourselfers, Listen Up

Installing a new processor in an older PC usually is a straightforward

job that shouldn't take more than half an hour or so. If you're comfortable handling a screwdriver and digging around inside a computer case, you should be able to tackle the job.

Your biggest potential problem is getting to the existing processor itself. In most systems, it's right out in the open. But if your model is loaded with add-in circuit cards, you might have to remove one or more of them to gain access. Things get a bit dicey with certain combinations of motherboards and computer cases,

Installation usually is straightforward and shouldn't take more than half an hour.

where the processor is hidden under a hard drive bay or a mounting bracket. In this case, motherboard removal is required, which isn't recommended for beginners. Unfortunately, you won't know where the processor is located until you venture under the hood.

Once you get to it, however, removing the old processor isn't difficult, especially with the special tools chip manufacturers provide. But it is a delicate job. You must take precautions against static elec-

TIP DELETE FILES BEFORE RUNNING DEFRAG

DOS 6 comes with a neat DEFRAG command that reorganizes your files so that DOS can access them faster. It takes a while, though: almost two hours on my 200MB drive. To save time, do some disk housekeeping before you defragment your disk, deleting all unnecessary files. These include outdated data files (you can put these on a floppy disk for long-term storage); old backup files, which usually have a BAK extension; old README files that you already have read; and any CHK files that CHKDSK /F turned up (unless you can figure out which file a CHK file belongs to, it's useless to you).

To search for files that have similar filenames and evaluate whether you want to delete all of them, use the DIR command with wildcard characters and the /S switch, which says "search all subdirectories for files that meet these criteria." For example, to locate BAK files, type this command from the root directory:

```
DIR *.BAK /S /P
```

The /P switch pauses the display so that you may make a note of the files you find.

If you prefer, you may use the following command to produce a printed list:

```
DIR *.BAK /S > PRN
```

—Kay Yarborough Nelson

tricity, and take care not to bend the 132 fragile pins (on a 386/486) as you remove the existing processor and plug in the new one. Even more crucial is to make sure the chip is plugged in correctly. If the right pins aren't in the right holes, you can destroy the new chip when you reboot.

The makers of upgrade chips mentioned here all provide detailed instructions and special tools for removing your old chip. Some even provide toll-free telephone help. But if you're at all uncomfortable doing brain surgery on your trusty old machine, your local dealer probably will be happy to do the job for you, for a price; expect to pay \$50 to \$75.

The Whole Truth

Let's talk realities: Upgrading your PC with a hot, new 486-compatible processor won't turn it into a full-fledged 486 system. That's because the new generation of chip upgrades must incorporate some design compromises that make up for the deficiencies of motherboards not meant to take full advantage of 486 power. (Cyrix mitigates this problem to some degree; the company has a patent on technology that lets the 486's on-chip cache work with 386 motherboards.)

Also, the processor itself is just one link in the chain of components that make up a system. An old, slow hard drive, for example, can drag down overall system performance. So, for many, a new hard drive is the most obvious match for a processor upgrade.

The current crop of drives can transfer data to the motherboard much faster than drives made just a couple of years ago. And their prices have been falling almost as quickly. For about \$200, you can get some 170MB of storage.

If your system has only 1MB or 2MB of RAM, you also may want to boost performance by adding more memory. This is especially crucial if you plan to run Windows, which gobbles memory. Although 4MB is a practical amount to install, 8MB is even better.

Some older PC motherboards don't have the sockets needed for a full RAM upgrade, however; many can handle only 4MB maximum, some even less. Another practical consideration is price. As this article was going to press, a RAM shortage was causing massive price increases. Don't expect RAM prices soon to match their low of \$35/MB during the summer of 1993.

Finally, although a processor upgrade always improves performance, your mileage may vary. I ran various benchmarks on the Gateway 386/25 that I upgraded with the Cyrix Cx486DRx2 chip. Performance increased two to six times over the system's original processor. But disk-intensive applications, such as database software, gave lower numbers.

Where a chip upgrade really shines is in processor-intensive operations, such as word processing and

PRODUCT INFORMATION

ALL Cards, \$249-\$449

ALL Computers Inc.
12185 Kinsman Road
Newbury, OH 44065
216-564-7875

Buffalo Power Kits, \$199-\$375

Buffalo Products Inc.
2805 19th St. S.E.
Salem, OR 97302-1520
800-345-2356

Cyrix Cx486DRx2, \$399-\$499

386SX-to-486 chip (price not available at press time)

CYRIX Corp.
2703 North Central Expressway
Richardson, TX 75080
800-462-9749

Intel OverDrive Processors, \$599-\$799

INTEL Corp.
2200 Mission College Blvd.
P.O. Box 58119
Santa Clara, CA 95052-8119
800-538-3373

Super SX, \$299-\$698

SuperComputers Inc.
8575 Willows Road
Redmond, WA 98052
206-881-7500

spreadsheet number crunching. And you can boost performance even more for number-intensive applications, such as spreadsheets or computer-aided design (CAD), by purchasing a math coprocessor to match your new processor. (None of the upgrades listed here include the on-chip math coprocessor of Intel's 486 processor.)

Restart Your Engines!

Many computer makers scoff at processor upgrades. That's not surprising; they'd rather sell you a whole new system. Still, a processor upgrade offers a relatively easy way to bring your PC into the contemporary world of 486 speed and power. And for those of us with Ferrari dreams but a Hyundai budget, it makes good sense. ■

Contributing Editor Stan Miastkowski has been translating computer technology into English for more than 15 years. He's coauthor, with Anne Fischer Lent, of the Windows for Workgroups Bible (Addison-Wesley).

START-UP CLINIC

If It Ain't Broke . . . Don't Fix It!

by Jack Nimersheim

Had he come of age in the 1980s, the great New York Yankees catcher, Yogi Berra, might today enjoy a successful career as a computer consultant. His sage advice, "If it ain't broke, don't fix it," could take him far. On second thought, Berra—as insightful as he is—might have a bit more trouble with PCs than he had in the big leagues. As reader mail frequently points out, even when DOS functions as its maker intended, you often get the sinking feeling that something is terribly wrong.

*Even when DOS functions
as its maker intended, you often
get the feeling that something
is terribly wrong.*

Mysterious Files

Every directory on my hard drive contains a file called CHKLIST.MS. I don't know where the little stinkers came from and would be grateful if you could tell me.

Also, several DOS books I own tell me that when I run CHKDSK, it uses the file-naming convention FILE00XX.CHK (where xx ranges from 00 to 99) to store portions of any corrupted files it discovers. Supposedly, I then can look at these CHK files and decide if I want to keep any of them. When I call one into my word processor, however, all I see is gobbledygook. How do I read the CHKDSK files?

*Don Hankinson
Gig Harbor, Wash.*

Believe it or not, nothing mysterious is happening inside your PC. Both the CHKLIST.MS and the gobbledygook—one of my favorite technical terms, by the way—indicate that DOS is working exactly as it should.

The pesky CHKLIST.MS files are the product of MSAV, the MS-DOS 6 utility that scans your disks for com-

puter viruses. The first time you scan a directory, MSAV creates a CHKLIST.MS file and records in it checksum information for each executable file (one with an EXE, COM, or BAT extension) stored in that directory. Stated simply, creating checksum information involves calculating values based on the hexadecimal code a file contains. As a rule, the checksum

values for an executable program don't change. If they do, it is a signal that the file's contents have changed, which is a possible indication that the file is infected by a computer virus.

Each time you run MSAV, it compares the current checksum values for your files with the initial values recorded in CHKLIST.MS. If one or more of the checksums don't match, MSAV warns you of a possible virus infection and names the problem file or files. So, don't erase those CHKLIST.MS files; they help MSAV protect your valuable programs.

The odd appearance of your CHK files is equally simple to explain. One of CHKDSK's primary functions is to identify any lost clusters a disk contains. Lost clusters occur when DOS gets "bewildered," for want of a better term. Figuratively speaking, DOS loses track of critical pointers that tell it where the different portions of a file are stored. (The technical explanation of what can cause lost clusters could fill this column, so I won't go into that.)

A corrupted file is unusable, but CHKDSK tries to help you recover corrupted files by storing any lost clusters it discovers in the CHK files you mentioned in your letter. So far, so good. At this point, though, things begin to get complicated.

You're on the right track using a word processor to

display the contents of these files. You also can use the DOS TYPE command. What you see with either of these methods determines whether you can restore the file you're viewing.

The gibberish you mentioned indicates that the lost clusters discovered by CHKDSK contain non-ASCII code, which means that they probably were part of a program file. Restoring these files to working condition is virtually impossible, unless you're a programming genius. The best you can hope for is to determine which program or programs on your disk were corrupted and reinstall them.

Things are different if the contents of a CHK file resemble familiar words and phrases, a sign that it contains ASCII code, or something close to it. Usually data files and DOS batch files store informa-

tion in this format. When an ASCII file is corrupted, you sometimes can restore it by "stitching together" the different CHK file segments.

One way to do this is to use your word processor to read in the CHK files and rearrange the data to reconstruct the original file. A second way is to determine the proper order of the pieces and use COPY to create a single file from the series of lost clusters. The following command, for example, combines the contents of FILE0000.CHK, FILE0002.CHK, and FILE0001.CHK, in that order, in a file called TEST:

```
COPY FILE0000.CHK + FILE0002.CHK + FILE0001.CHK TEST
```

Although it has limited powers, CHKDSK is invaluable under certain conditions. I once rebuilt an entire chapter of a book, using my word processor to combine the CHK files that CHKDSK turned up in its search for lost clusters.

TIP DISPLAYING DIRECTORIES ONLY

Sometimes it's useful to display or print a list of the directories on your hard drive without also listing the files. Beginning with DOS 5, the DIR command offers a command-line switch to do this. Typing:

```
DIR /AD
```

will display only directory names. However, an undocumented quirk of the DIR command lets you do this with earlier versions of DOS as well. The command is:

```
DIR *.
```

That's DIR followed by an asterisk and a period. Both of these commands show only those directories or subdirectories that are immediately below the current directory.

There are additional possibilities if you have DOS 5 or higher. If you are in the root directory of your hard drive and type:

```
DIR /AD /S /B
```

you will get a list showing the full pathname for every directory and subdirectory on your hard drive. The /S switch causes the command to include all subdirectories, while the /B switch suppresses the display of heading and summary information and forces the display of one entry per line, along with the complete path for each entry.

To send the list to your printer or a disk file, add the redirection operator. For instance:

```
DIR /AD /S /B > PRN
```

sends it to the printer, while

```
DIR /AD /S /B > DIRLIST.TXT
```

sends the directory list to a file called DIRLIST.TXT.

Try it! You may find subdirectories you never knew you had.

—Jeff DeTray

Requiem for a Bios?

I'm having trouble installing a second hard drive in my computer. None of the disk selections that my 1988 Phoenix BIOS offers match those for my new drive. When I installed my first hard drive, I used the option that permits you to set user-defined parameters. Do I need a new BIOS chip and, if so, where can I get one?

Richard Lasio
Niagara Falls, Ontario

Let me answer the second part of your question first. It may, indeed, be possible to install a new BIOS chip in your PC. To find out, gather together all of the information you can about your system and call or write Phoenix Technologies Ltd. (846 University Ave., Norwood, MA 02062; 617-551-4000).

With some PC compatibles, you can upgrade the BIOS by simply plugging a new chip into the motherboard. If you describe your PC in detail, the technical staff at Phoenix Technologies should be able to tell you whether this is possible for your system. Even if you can't replace the BIOS, however, all is not lost.

BIOS drive parameters identify three settings for a hard drive: the

number of cylinders, the number of heads, and the number of sectors per track. Ideally, the configuration you choose in your BIOS should match those for the hard drive you're installing. If no exact match exists, however, you can specify different settings, as long as each drive parameter listed in your BIOS is equal to or less than that for the drive itself. To make the most of the new drive, you must find the approximation that offers the greatest storage capacity.

For example, a Seagate ST4096 drive, which has 1,024 cylinders, 9 heads, and 17 sectors per track, provides a maximum storage capacity of 76.5MB. An ST4096 would run properly using BIOS settings for 1,024 cylinders, 8 heads, and 17 sectors per track. The only drawback is that, because these settings normally are for a 68MB drive, you sacrifice approximately 8.5MB of potential storage space (about one-ninth of the disk's maximum capacity).

Another alternative is to use a partitioning utility, such as SpeedStor (Storage Dimensions Inc., 1656 McCarthy Blvd., Milpitas, CA 95035; 408-954-0710), to trick your system into recognizing the settings required by your new drive. If SpeedStor doesn't find an exact match in the BIOS table, it writes the correct values into the first hidden sector in the hard disk partition table, where your system looks for them at bootup.

Missing Memory

I have a 286 system with 1MB of RAM. How can I increase the amount of memory available to my programs by loading memory-resident programs and device drivers into memory above 640K?

*Guy Martineau
Quebec, Quebec*

You can't—at least not with DOS's memory manager, EMM386.EXE. It works only on systems equipped with a 386 or higher processor. MS-DOS does, however, let even 286 users reclaim some conventional RAM by adding the following two lines to the beginning of CONFIG.SYS:

```
DEVICE=HIMEM.SYS
DOS=HIGH
```

(The first command assumes that HIMEM.SYS is stored in the root directory of your boot drive. If this isn't the case on your system, add the appropriate path information to that line.)

Installing HIMEM.SYS lets you load a portion of DOS into the high memory area, or HMA. The command DOS=HIGH accomplishes this task. Loading DOS high increases by approximately 20K the amount of con-

ventional RAM that is available to your application programs.

You have other alternatives for your 286, as well. The ALL ChargeCard (ALL Computers Inc.; 216-944-0110), an adapter you plug into one of your system's expansion slots, gives you access to memory above 640K on a 286.

Possible software solutions include QRAM from Quarterdeck Office Systems (310-392-9851) and MOVE'EM from Qualitas Inc. (301-907-6700). Be aware, however, that not all 80286 CPUs are created

BIOS drive parameters identify three settings: the number of cylinders, the number of heads, and the number of sectors per track.

equal. Whether and how well any of these products works on your system depends on the type of chip set it contains. Before purchasing a product of this type, call its manufacturer and verify that it will work with your computer.

A shareware program written by Chris Blum of Wooster, Ohio (216-262-3786), also may help 286 owners who need to free up more memory. Called UMB_DRV.RSYS, the program works with many 286s, letting you load device drivers and memory-resident programs into high memory. You'll find the file on CompuServe in the IBMSys Forum or on the DOS Resource Guide Bulletin Board (603-924-3181). And see DRG#12, page 79, for a detailed write-up on this program.

Unfortunately, not even UMB_DRV.RSYS works with all 286s. Will it work with yours? An accompanying file, UMBDRV.TXT, lists all the chip sets that can work with this memory driver. If yours is among them, UMB_DRV.RSYS will give you considerably more room in which to run your programs. Among those included in the list of supported 286s are those from Chips & Technologies, Texas Instruments, United Microelectronics, VLSI, and Sun Electronics, but not all the 286 chips produced by these manufacturers work with UMB_DRV.RSYS. I urge you to check with Chris before you go to the trouble of downloading the program. ■

Jack Nimersheim has been using and writing about computers for over 13 years. He has written 20 books on computer-related topics. His DOS 6.0 Handbook (\$27.95; Random House Computer Books) was released in April 1993.

Q&A

DOS

Q I just purchased a Samsung SP-2412 printer and connected it to LPT2. I also have a laser printer connected to LPT1. I want to direct output from my programs and the Print Screen key to LPT2, but I can't seem to accomplish this. Can you tell me how to tell DOS to print to LPT2?

A By default, the Print Screen function automatically sends its output to DOS's PRN: device, the printer connected to LPT1. Because DOS's MODE command doesn't let you redirect output from one parallel port to another, you can't solve your problem from the DOS command line. But several utilities let you temporarily swap the port addresses used by LPT1 and LPT2, which fools DOS into sending the printer output to LPT2. You can run a utility of this sort from the command line just before you want to print to LPT2.

I wrote a small utility program called SWAPPORT.COM to solve this very problem. I will make it avail-

able on the *DOS Resource Guide* BBS, where *DRG* readers may download it free of charge. The BBS telephone number is 603-924-3181. (Settings are 300-14,400 bps, 8 data bits, no parity, and 1 stop bit.)

Alternatively, you can type in the QBasic program listing SWAPPRNT.BAS, which does the same thing as SWAPPORT.COM, except that it requires you to run the program from within QBasic. Type in the listing in QBasic's opening screen, then choose the Save As option from the File menu. A box containing a cursor will pop up; type SWAPPRNT.BAS and press Enter. QBasic will save the program to your current directory. The quickest way to run the program is to go to your QBasic directory (or place the appropriate PATH statement in your AUTOEXEC.BAT file) and type QBASIC SWAPPRNT.BAS. You also can type QBASIC alone, wait for the opening screen, then use the File menu's Open option to enter the program name. Finally, press Shift-F5 to run SWAPPRNT.BAS.

Q Now that I have added DoubleSpace to my hard drive, I'm wondering if I

have to worry about keeping files compressed. If I issue a COPY command, for instance, does DOS automatically compress the duplicate file? Or must I manually compress the file using a DoubleSpace command?

A DoubleSpace takes care of everything for you. When you type this command:

COPY MYFILE.DAT A: C:

the DoubleSpace driver automatically compresses MYFILE.DAT before storing it in the compressed volume file (CVF) that you established for drive C.

When you start an application, the procedure is reversed. DoubleSpace quickly decompresses the requested file before it is loaded into your computer's memory. You can sit back and relax.

Q Can you explain the meaning of the DOS error message, "Sharing violation reading drive C"? The error seems to occur only during file backup operations. I can't find any documentation in my DOS manuals about this problem.

A The error you describe is SHARE.EXE's way of telling you that you are attempting to access or modify a data file that already is in use. Permitting simultaneous access could lead to serious data corruption.

If you work in a multiuser or networking environment, find out who is using the file, or files, in question and have the user close the file so

SWAPPRNT.BAS changes the printer port to which DOS prints from LPT1 to LPT2. (QBasic users may omit the listing's line numbers.)

5	DEFINT A-Z	
10	DEF SEG=&H40	' ROM BIOS data area
20	FOR J=0 to 3	' Two 16 bit numbers
30	A(J)=PEEK(J*8)	' Read LPT1 and LPT2 addresses
40	NEXT J	' into small array
50	SWAP A(0),A(2)	' Swap LPT1 and LPT2 LSBs
60	SWAP A(1),A(3)	' Swap LPT1 and LPT2 MSBs
70	FOR J=0 to 3	' Two 16 bit numbers
80	POKE J*8,A(J)	' Restore addresses
90	NEXT J	' from array
100	DEF SEG	' Restore Basic's DS
110	SYSTEM	' Return to DOS

that you can back it up. If you don't work in a multiuser or networking environment, the problem may be a bug in your backup program. In that case, I suggest you contact the company that created the software for a solution.

HARDWARE

Q Since I installed DOS 6 on my hard drive, I've had nothing but problems. DOS's CHKDSK program now reports my hard drive is losing data clusters. The problem occurs daily and seems to be getting worse. How can I correct it?

A I wouldn't be too quick to blame DOS 6 for your lost data clusters; the problem may be hardware or software related. I recommend that you use the process of elimination to find out what's causing the trouble, evaluating the most likely causes first.

A malfunctioning hard drive or controller card sometimes causes DOS to write bad sector-ID bytes to the file allocation table (FAT). The FAT contains a data "road map" that tells DOS where information is stored on your hard drive. I suggest that you begin by verifying that your hardware is working correctly. A utility program such as SpinRite III (Gibson Research, 800-736-0637) can help you verify that your hardware is working as advertised. It also can scan the surface of your disk, looking for damaged areas of the data platter.

Other hardware problems that might be causing the symptoms you have described are a malfunctioning main power supply or power fluctuations in the AC electrical wiring that feeds into your home or office. A high-quality AC line conditioner and a surge-suppressing power strip will help eliminate the

majority of power-line problems.

If you use disk-caching software that delays writing cached data to your hard disk (DOS 6's SmartDrive utility has an option that allows such delays), I suggest that you temporarily disable the disk cache by removing its entry from your computer's start-up files. Then reboot your computer to make the changes in AUTOEXEC.BAT and CONFIG.SYS take effect.

If SmartDrive is the source of the trouble, you should consider using the program's /C switch to ensure that all cached data is written to memory before you quit for the day. To do this, issue the following command and then immediately turn off your system:

SMARTDRV /C

This tells SmartDrive to write to disk any data still in memory when you turn off your PC, minimizing the possibility that DOS will write bad sector ID bytes to the FAT.

If the problem persists, I suggest that you take your PC to a qualified technician for a thorough checkup.

Q When I try to format my hard disk using DOS 5's FORMAT command, I get a "Format failure" message. I suspect that my hard drive has incurred physical damage in the area where FORMAT is attempting to write the DOS file allocation table. Can DOS's FDISK program find and lock out the bad disk sectors? Can I tell it to avoid the bad disk areas when setting up the DOS data partition?

A Unfortunately, FDISK can't identify and lock out bad data sectors on your hard disk. To solve your problem, use a low-level format program supplied by your hard drive's manufacturer to locate and mark bad data cylinders, then run FORMAT.

UTILITIES

Q Is DOS 6 compatible with AddStor's SuperStor Pro disk-compression utility? I use DOS 5 and have a hard drive that was compressed by that program. May I install DOS 6 with my compressed SuperStor drive in place? Must I reconfigure the compressed drive using DoubleSpace file compression?

A Yes, you can use your existing SuperStor-compressed drive with DOS 6, but first you'll need to lay a little groundwork. If you try to install DOS 6 before doing this, SETUP issues this message:

"Your computer uses SuperStor disk compression"

To get on the right track, you must use SuperStor's ADD2SWP.EXE program in order to make your computer's uncompressed drive accessible to SETUP. If your SuperStor installation disks contain ADD2SWP, carry out the procedure described below. If not, contact AddStor at 800-732-3133 to order the program.

Once you have obtained a copy of the ADD2SWP.EXE program, follow these steps:

- Insert in drive A or B the SuperStor disk containing ADD2SWP.
- Type A:ADD2SWP [drive]:, where drive is the letter of your hard disk's start-up drive.
- Follow the instructions on your screen.
- After restarting your computer, run DOS's SETUP program. ■

"Q&A" is compiled by Technical Editor John Wolfskill, president of Powertrain Development, a New Hampshire-based software development company.

(Continued from page 80)

ond to where I was when I left WordPerfect. It's called **SwapDos 1.0**.

This program has turned WordPerfect into a shell from which I run whatever I like without wasting time or losing my place. For example, to run the DOS editor from inside WordPerfect, I type EDIT FILESPEC and press the Enter key. Under MS-DOS 6, I've found that SwapDos will hang the system when you swap out of a program that has been loaded high. However, I use it with J.P. Software's 4DOS 4.02, with which it works perfectly.

Frederick L. Sohn
New York, N.Y.

Most programs assume that when you "shell to DOS" you really want to run a simple command such as DIR

or COPY. Then you'll return to your application with an EXIT command and continue what you were doing.

SwapDos thinks you might want to do more when you shell to DOS. It examines memory and removes the suspended program (the one you left to go to or shell to DOS). It stores that program, along with its data, in expanded or extended memory or on disk. Once SwapDos has removed the program from memory, it presents a DOS prompt. You have almost as much memory available as you did before you started the suspended program, and you can run almost any program, execute any DOS command, or anything else you might do at the DOS prompt. When you are done, you'll have to type EXIT twice. The first instance removes SwapDos and restores the suspended program; the second takes you back to your original application.

You can save a step by letting SwapDos run the command or program for you. If you really want to study the SwapDos documentation, you also can do some tricky program and memory swaps.

SwapDos will, indeed, let you use almost any program as a shell to run your computer. Like Mr. Sohn, you can start from WordPerfect and set up a keystroke macro that will run SwapDos and prompt you for the new program you want to run. You can do the same sort of thing from many spreadsheets, database managers, and other major programs.

I guess the important question is, will you actually do so? If you have a need for SwapDos, it is well worth its modest registration fee. But you might find that a full-fledged task switcher such as DESQView, Windows, or the shareware program Back & Forth is more to your liking. With one, you can leave several programs open and switch between them almost instantly.

The SwapDos documentation is written in a "shareware techie" style that assumes the reader already understands the program. You'll have to read it two or three times before you install the program. But all of the necessary information is accessible in the documentation, and technical support is available if you need it.

TIP CHECK YOUR FILES' COMPRESSION RATIOS

If you have installed DOS 6 and its DBLSPACE disk-compression program, you may display the compression ratio for any file by using the DIR command with its /C switch. For example, to display the compression ratio for TEST.ASC, type:

```
DIR TEST.ASC /C
```

To see the ratios of all files in the current directory, type this command:

```
DIR /C
```

When you use DIR with /C, DOS calculates the compression ratio by dividing the amount of disk space required by the uncompressed form of the file by the amount of space required by the compressed version of the file. The calculation takes into account the fact that uncompressed drives store files in multiples of whole clusters, whereas DBLSPACE allocates space to files in sector increments.

/C has a second cousin, /CH; the difference between the two switches is subtle. When /C calculates the space required by the file in uncompressed form, it assumes a cluster size of 8K (16 sectors per cluster). In contrast, /CH uses the actual cluster size of the disk on which DBLSPACE is installed. As a result, /CH usually reports more conservative compression ratios.

If the compression ratio of your files is important enough that you want to make it a permanent part of your directory listings, you may add the following command to your AUTOEXEC.BAT file:

```
SET DIRCMD=/C
```

This command sets up the DIRCMD environment variable, which DIR uses to determine its default format for displaying directory listings.

If you want DIR to use the actual cluster size of the drive on which you installed DBLSAPCE, add this line to your AUTOEXEC.BAT instead:

```
SET DIRCMD=/CH
```

—Doug Lowe

SHARE THE WEALTH

Shareware Exchange invites you to send a copy of your favorite shareware, along with a description of the program and an explanation of why you like it (500 words or less), to Shareware Editor, *DOS Resource Guide*, 80 Elm St., Peterborough, NH 03458. Be sure to tell us how we can obtain a copy of the program. We'll pay contributors \$50 for each program featured in this column. Please, don't send us shareware that you have written—we want recommendations from users, not from authors. You can contact us on CompuServe at 75300,2361 or on the *DOS Resource Guide* bulletin board system (BBS) at 603-924-3181.

All programs featured in Shareware Exchange are available electronically from the *DRG* BBS. There are no connect-time charges—you pay only for the phone call.

Set your communication program's parity settings at 8 data bits, no parity, 1 stop bit (8,N,1). Then dial 603-924-3181 and wait for the "Connect" message, which tells you that you've entered the BBS successfully. If you're a first-time user, the

system will ask you to verify the spelling of your name and to choose a password. Then it will display a general information screen, followed by a questionnaire containing 10 questions about your address, phone number, and so on. (You must answer the questionnaire to set up your user account and gain access to the BBS.)

From this point on, the on-screen prompts are the same for all users. Press C (Continue) at the next screen to access the main menu. From there, press the F key (for File Menu) and Enter, followed by L (List Available Files) and Enter. Then you'll see a list of file areas. Choose the number (2-5) that corresponds to the shareware category listed for each program in this article, and follow the downloading instructions on screen.

All four of this issue's programs are in the Shareware Utilities file area. In addition, most of the programs described here also can be found on major on-line services and local BBSs.

—Eds.

DOS to the MAX

DOSMAX 2.1 is a collection of programs that maximize the size of low memory by moving most of DOS's data into upper memory blocks. It works well with most versions of DOS and most popular memory managers.

Jerome Czeikus
Victorville, Calif.

DOSMAX is a combination of programs called STOPMAX, FREELOAD, SHELLMAX, and DOSMAX. To understand how they work together, you may need a brief memory refresher.

The computer's base memory, or DOS memory, is the lowest 640K. Some or all of this memory is available on all DOS computers. It is shared by system data, DOS and its data, any memory-resident utilities you use, and the programs you run. Many programs need as much base memory as possible, so many users are always looking for utilities that will help them keep this area free. DOSMAX is one such utility.

Upper memory blocks are areas of memory between 640K and 1MB. These UMBs are nestled among the other devices in this memory area, like video boards, disk controllers, and the system ROM BIOS. To create UMBs, you need a 386 memory manager such as DOS's HIMEM.SYS, QuarterDeck Office Systems' QEMM (formerly QEMM-386), or Qualitas' 386MAX, or a specialized 286 memory manager along with one of the special 286 chip sets. Many memory-resident utilities can be loaded into the upper memory blocks to leave more free base

memory for application programs.

Finally, the high memory area (HMA) is a special section of memory located just above the 1MB border. It can be used to hold part of DOS with the DOS=HIGH command in your CONFIG.SYS file, again freeing more base memory for applications. However, DOS runs slightly slower from the HMA than it does from base memory.

STOPMAX keeps DOS from loading into the HMA on the theory that other programs, such as Windows, can use that area of memory more efficiently. DOSMAX moves DOS data structures and parts of DOS itself into UMBs. If you use QEMM, FREELOAD frees more base memory by releasing the memory that LOADHI.SYS reserves for its own use. And SHELLMAX puts the command interpreter into a UMB.

If you need to wring every last drop of base memory to get your favorite programs to run, DOSMAX is worth a trial. It didn't help my system, with QEMM version 7.01, at all, but that didn't surprise me. The latest QEMM has its own utilities that duplicate most of the features of DOSMAX.

DOSMAX did work well on my system, however, once I got through its poor documentation. If you try it, struggle through as much of the standard documentation as you can to get a feel for the program, then load EXAMPLES.DOC into a text editor or word processor and find a sample installation that matches your system as much as possible. Copy that and then go back to the documentation to make whatever changes are necessary.

Above all, make sure you have a bootable disk and

a copy of your original configuration files before you start. It is possible, even likely, that an interaction between DOSMAX, your memory manager, DOS, and your other utilities will hang the system at least once while you are trying to find the correct installation parameters.

Paint like a Pro

*I have been using **NeoPaint** and recommend it to anyone who needs a graphics program. It can be found on many bulletin board systems as NEOPAINT.ZIP or NP1.ZIP through NP5.ZIP.*

*Lane Heape
Wichita, Kan.*

I installed NeoPaint, selected from its list of over 300 supported printers, and fired it up. What a pleasant surprise! It has an excellent user interface, a professional feel, and more drawing tools than many commercial programs.

I don't have room to mention all of its features. It has an extensive color palette; the normal complement of line drawing tools and erasers in a variety of shapes; text; flood fill; and an airbrush. It also has an optional snap-to-grid feature for better alignment of lines and shapes.

But more impressive is one of the easiest and most flexible polygon drawing tools I've seen. You put a simple polygon on the screen, then move a corner and add (or delete) corners as you wish. The program also has tools to create three-dimensional cubes and pyramids, which you can rotate and stretch before you place them on an image.

For adding text to a drawing, NeoPaint includes 12 fonts in multiple sizes with optional bold, italic, underline, outline, and shadow effects. You can buy additional fonts or use any GEM-compatible (.GFT) screen fonts you have available.

One of the nicest features is that the program can import and export image files in 2-, 16-, or 256-color PCX, GIF, and TIFF formats. That makes NeoPaint handy for converting from one format to another and for retouching images you already have. And, because the program can use expanded and extended memory, as well as hard disk space as virtual memory, you can open several images at a time and copy from one to another.

The program supports EGA, VGA, and super VGA graphics modes. To use SVGA mode (for 800-by-600-pixel or 1024-by-768 resolution), you must have a video card with one of its supported chip sets or a VESA driver for your card. The program can recognize and work with Tseng Labs, Paradise, Western Digital, Video 7, ATI, and Trident chip sets automatically. Unfortunately, my video card doesn't fit any of these requirements, so I could work only in standard VGA (640-by-480) mode.

Included is a simple graphics-capture program that remains in memory and saves any graphics screen to disk when you press the hot key. I would be a little happier with the screen capture if it also could capture a text screen and save it in graphics format, but you can't have everything.

The one flaw in this otherwise excellent program is its documentation. The README file will get you started, but it doesn't explain how to use any of the program's nifty features. The on-line help is good, but I would have preferred printing a documentation file and studying the program's tools instead of searching for them in the help menus.

If you are looking for a good DOS-based paint program, you owe it to yourself to try a copy of NeoPaint. It costs hundreds of dollars less than most competing commercial products and has some unique features and an excellent user interface. If it has all the capabilities you need, you'll find that it is an excellent value. ■

Technical Editor Hardin Brothers has been working with and writing about computers for 14 years. He also evaluates shareware programs for CompuServe magazine and CompuServe's Online Today electronic magazine.

PRODUCT INFORMATION

DCopy Plus 2.0, \$15

Scott Abramowitz
P.O. Box 25724
Fort Lauderdale, FL 33320
Mail or CompuServe inquiries only
(CompuServe I.D. 74166,3562)

DOSMAX 2.1, \$15

Philip B. Gardner
10461 Lever St.
Circle Pines, MN 55014
612-785-9439

SwapDos 1.0, \$30

Innovative Data Concepts
1657 The Fairways
Suite 101
Jenkintown, PA 19046
215-884-3373

NeoPaint 2.0, \$52

OSCS Software Development Inc.
354 N.E. Greenwood Ave., Suite 108
Bend, OR 97701
503-389-5489

Index to *DOS Resource Guide* Tips: Issues 1-12

TIP TITLE	ISSUE PAGE	DESCRIPTION
ANSI.SYS TRICKS		
Super PROMPT	DRG#1 11	Use this prompt to show the time, date, and current subdirectory whenever DOS displays its prompt.
Full-Function Keys	DRG#1 12	FUNK.BAT uses ANSI.SYS to program control-key combinations to execute common DOS commands.
Drawing a Blank	DRG#3 74	BLANK.BAT uses ANSI.SYS to help extend your monitor's life by blanking the screen.
A Timely PROMPT	DRG#5 22	Keep track of time by adding this line to your AUTOEXEC.BAT file.
Put More Lines on Your Screen	DRG#8 22	Use ANSI.SYS and MODE to put 43 or 50 lines of text on your monitor's screen.
Color-Coordinated Drives	DRG#8 62	Use ANSI.SYS and PROMPT to create batch files that change the screen color each time you switch drives.
A RAM Disk Reminder	DRG#10 59	Add a PROMPT command to AUTOEXEC.BAT so that you never forget to consider the contents of your RAM disk before shutting down your system.
Screen Gems	DRG#11 20	Using PROMPT to change your system's video attributes can put a little sparkle in DOS's ordinarily dull screen display.
BASIC PROGRAMS		
Pick a Day, Any Day	DRG#1 19	DAY.BAT shows how to use Basic within a batch file, rather than relying on a separate Basic program.
	& Sp#2 38	
Key States	DRG#3 60	Use GETKEYS.BAS to check the state of your Num Lock, Caps Lock, and Scroll Lock keys; then use the number it returns when running SETKEYS.BAS in your AUTOEXEC.BAT.
Deleting Files with QBasic	DRG#10 34	DELBAK.BAS provides a quick way to clean up a hard disk littered with BAK files.
BATCH FILES: IMPROVING YOUR REPERTOIRE		
Full Function Keys	DRG#1 12	FUNK.BAT uses ANSI.SYS to program control-key combinations to execute common DOS commands.
Melting Pot	DRG#1 16	GO.BAT helps you save disk space by putting all your batch files under one roof.
	& Sp.#2 42	
Batch-File Subroutines	DRG#1 17	FORMAT4.BAT shows how to create a subroutine within a batch file.
Speed Tip	DRG#1 17	Employ a FOR statement to speed the execution of batch files.
Toneful Batch Files	DRG#1 17	Adding beeps to batch files tells users to pay attention.
Pick a Day, Any Day	DRG#1 19	When you give DAY.BAT a date, it tells you on what day of the week it falls.
	& Sp.#2 19	
Shortcut for Short Batch Files	DRG#1 28	Creating short batch files using the COPY CON command.
Blank Batch Lines	DRG#1 39	Use this simple trick to add blank lines to your batch files.
Drawing a Blank	DRG#3 74	BLANK.BAT helps extend your monitor's life by blanking the screen.
	& Sp.#2 69	
Into the Void	DRG#4 44	The greater than (>) redirection symbol and a NUL command provide a way to keep unwanted DOS messages from appearing on screen.
Type It PDQ!	DRG#6 50	TYPER.BAT lets you use your printer as a rudimentary typewriter.
Look: No Hands	DRG#6 52	Create a data file that lets your batch files proceed when you expect an affirmative response to a prompt for confirmation.
No Shorter Way, Period	DRG#7 29	Putting double periods (..) to work in your AUTOEXEC.BAT's PATH statement makes life simpler.
Keeping Your Screen Clean	DRG#8 63	Reduce screen clutter by making judicious use of DOS's NUL device.
A Well-Directed Remark	DRG#10 23	What REM can and can't do for your batch files.
Blankety, Blank, Blank	DRG#10 31	Use ECHO and a period to add blank lines to your batch files.
Redirecting the Output of Batch Files	DRG#10 48	Normally, DOS refuses to redirect the output from a batch file, but you can trick it into doing so.
Beware of Blank Lines	DRG#11 40	If you create batch files with EDLIN or EDIT, be sure to insert the ^Z end-of-file character as the last line in the file.
BATCH FILES: MANAGING FILES AND DISKS		
Path Swapper	DRG#1 13	ADDPATH.BAT lets you add a new subdirectory to the beginning or end of your current path setting whenever you please.
No Replacement	DRG#1 24	If you use a RAM disk, you'll appreciate this two-line batch file that copies updated files back to your hard disk at the end of your computing session.
Directory Returns	DRG#1 25	This pair of batch files lets you store the current path, move to another directory, and later restore the original path.
Directory Sorts	DRG#1 29	Four short batch files that let you sort directory listings alphabetically, by extension, by date, and file size.
	& Sp.#2 64	
Where Was I?	DRG#1 36	When you use WP.BAT to run an application, it remembers which file you were working in and lets you return to that file the next time you run the application.
Multiple COPY	DRG#1 43	CPY.BAT lets you duplicate several files with unrelated names or copy to a single directory files from several directories.
XCOPY Backups	DRG#1 43	Instead of relying on BACKUP or MSBACKUP to perform full-scale backups, why not create batch files that use XCOPY to perform backups every time you exit an application?
Copy Right	DRG#1 48	These two versions of VCOPY.BAT use FC.COM and COMP.COM to automate the procedure for comparing two files.

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Hardware Update	01 ☐	02 ☐	03 ☐	04 ☐	05 ☐
Reader Tips	06 ☐	07 ☐	08 ☐	09 ☐	10 ☐
Reader Forum	11 ☐	12 ☐	13 ☐	14 ☐	15 ☐
Gookin on DOS	16 ☐	17 ☐	18 ☐	19 ☐	20 ☐
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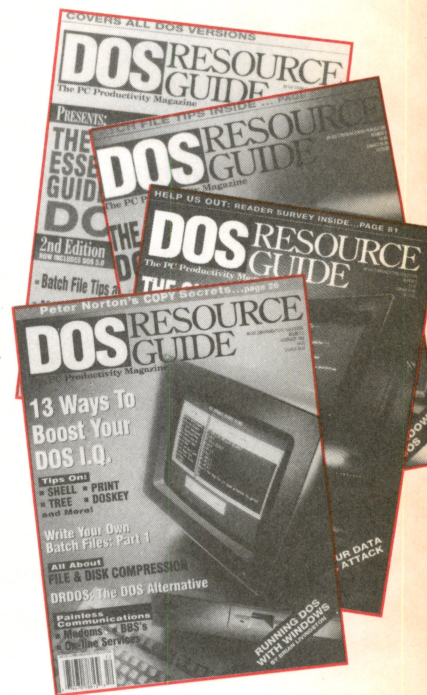
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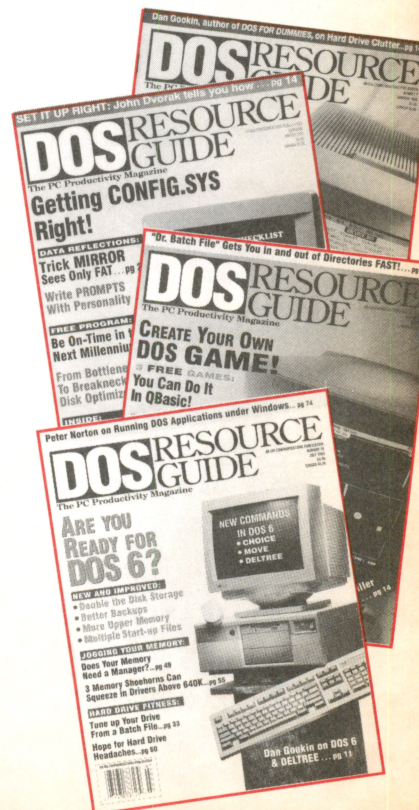
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THE COVER PRICE

TIP TITLE	ISSUE PAGE	DESCRIPTION
Snooping Dupes	DRG#1 52 & Sp.#2 32	When you want to get a list of the files common to two directories, use FINDDUPS.BAT.
More Searches and Sorts	DRG#1 53	SRT.BAT and GET.BAT can help maintain formatted files, such as name-and-address lists, or search through ASCII files.
Taking Out the Garbage	DRG#1 56	DE.BAT copies files to a temporary directory or to a RAM disk before deleting them, which means you can recover them if you immediately realize that you made a mistake.
Directory Crib Notes	DRG#1 57	LOG.BAT and CAT.BAT let you create and display a descriptive catalog of the files in the current directory.
Boolean Searches	DRG#1 58	FIND.BAT and S.BAT let you conduct logical searches for as many words and spelling variations as can fit on the DOS command line.
Find That File	DRG#1 59	FINDIT.BAT helps you locate files that you've misplaced on your hard drive.
Home, Please	DRG#1 75 & Sp.#2 34	DIRECTOR.BAT remembers your current drive and directory so that it can return you there later.
Directory Assistant	DRG#3 29 & Sp.#2 57	GO.BAT lets you change directories and run a program without hunting around for a backslash.
Text Search	DRG#3 29	These two versions of SEARCH.BAT let you search several groups of files for a string or a series of strings.
Get Back Where You Belong	DRG#3 33 & Sp.#2 74	GRABLOC.BAT stores your current drive and directory in GOBACK.BAT, which later returns you to the original directory.
Clean Up Your Hard Drive	DRG#3 43	Like DEL /P (DOS 5 and later), CLEANUP.BAT makes it easy to selectively delete unwanted files from a directory.
Mix and Match Batch	DRG#3 53	DIRCOMP.BAT lets you compare a disk or disk directory against your backup files.
Status Quo	DRG#3 69	STATUS.BAT keeps an up-to-date record of your hard disk's contents.
More Is Less	DRG#5 43	Use VIEW.BAT instead of TYPE to peruse text files one page at a time. (Correction: DRG#6, page 9.)
One-Step Directory	DRG#5 51	ERASEDIR.BAT quickly erases files and the directory where they reside.
No Shorter Way, Period	DRG#7 29	Putting double periods (..) to work in your AUTOEXEC.BAT's PATH statement makes life simpler.
XCOPY Asks for a Disk	DRG#8 57	XCOPY and its /M switch offer a faster alternative to BACKUP.
Color-Coordinated Drives	DRG#8 62	Use ANSI.SYS and PROMPT to create batch files that change the screen color each time you switch drives.
Another Use for NUL	DRG#9 17	Use DOS's assumption that all disks contain a filename called NUL to find out whether a particular drive exists on your system.
A Batch File That Prompts for Deletions	DRG#10 24	A simple batch file that uses DEL's /P switch (DOS 4.0 and later) to guard against deleting important files.
Improving on MKDIR	DRG#12 18	ND.BAT lets you create a new directory and switch into it automatically.
Meet SWAP	DRG#12 45	If you want to swap the name of two files, call on SWAP.BAT.
The Directory Approach to DIR	DRG#12 53	DIRS.BAT provides a listing of all the subdirectories, and only the subdirectories, within a particular directory.
Exceptional Deletion	DRG#12 54	DELBUT.BAT lets you delete all the files in the current directory, except a given file or group of files.
Getting the Jump on Directories	DRG#12 69	Equipped with a series of batch files such as FULF.BAT, you can navigate among deeply nested directories with ease.

DEBUG SCRIPTS

Colorful Start-Ups	DRG#1 7	Create an executable file that you can use to set screen colors at start-up.
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G'Day, Mate	DRG#3 8 & Sp.#2 40	Create programs that retrieve the day of the week and the day of the month from DOS and return it to a batch file as an error level.
Defusing Printer Codes	DRG#3 47	Creating a program that lets you record printer codes on paper for future reference.

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Conserving Memory	DRG#5 41	Adding a STACKS=0,0 command to CONFIG.SYS conserves 2K of conventional RAM.
Faster Task Switching	DRG#5 47	Setting up a RAM disk in CONFIG.SYS lets you use extended or expanded memory to speed up task switching under DOS 5 and later.
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Adding Onto Start-Up Files	DRG#12 50	When you don't have an editor handy, you can use COPY and COPY CON to add a line or two to your start-up files.
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Pruning TREE	DRG#1 52	Teaming TREE with FIND, SORT, and MORE produces more readable and more useful information about your directory structure.
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Coming Up Empty	DRG#7 46	Issuing the right DIR command and ATTRIB commands helps ensure that a directory is empty before you try to delete it.

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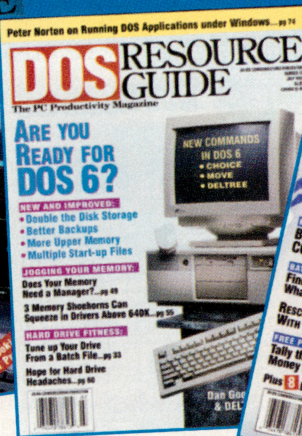
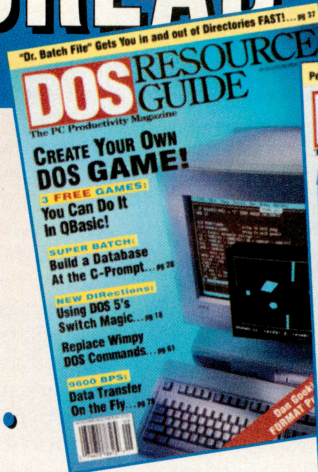
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DON'T MISS AN ISSUE!

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Find a File, Any File	DRG#7 60	Under DOS 5 and later, you can use DIR /S or ATTRIB /S to find missing files fast.
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MEMORY MANAGEMENT

Understanding DMA Channels	DRG#1 59	The minimum you need to know about Direct Memory Access (DMA) channels before you hook up a peripheral device.
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Make Your Last Drive Your LASTDRIVE	DRG#7 32	Conserve memory by adding the right LASTDRIVE command to your CONFIG.SYS file.

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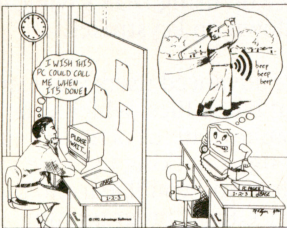
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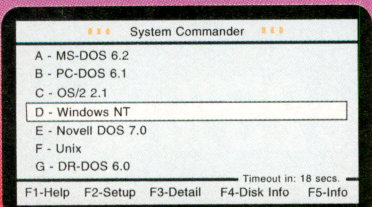
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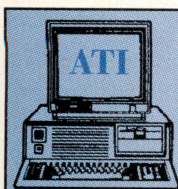
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SHAREWARE EXCHANGE

Delightful DOS Discoveries

Hardin Brothers

It's the DOS user's nature to watch for utilities that make computing a bit faster, easier, or more efficient. It also seems to be his or her nature to share a great discovery. This month's column features three such programs. First, DCopy is a top-notch floppy-disk copier that eliminates disk swapping when copying to the same drive. Second, SwapDos allows a DRG reader to run programs from WordPerfect, letting him or her use WP as the primary computing environment. Finally, DOSMAX moves most of DOS into upper memory blocks for better memory use.

For a change of pace, I also took a look at a terrific paint program called NeoPaint that rivals some commercial programs for features.

DCopy or Not DCopy

*Please review this piece of shareware, **DCopy Plus 2.0**. I downloaded it from a local bulletin board system. I have tried numerous disk-copy programs, and this is by far the best.*

*Carl S. Keehin
Eau Claire, Wis.*

DCopy seems to be an excellent program. It can be run from the command line, like DOS's DISKCOPY, or from a simple user interface that recognizes keystrokes or a mouse. However, the mouse interface seems a little clumsy to me because no mouse cursor is visible.

It only works with floppy disks, copying from A to B, B to A, or either drive to itself. It makes copies in a single pass, even if you are copying from a drive to itself. That means that you don't have to worry about

swapping disks and the risk of inserting the wrong disk at the wrong time. It can copy standard data disks and self-booting disks.

One of DCopy's nicest features is that it can make multiple copies of a disk without rereading the source. DOS DISKCOPY needs to reread the original disk before making each copy. With DCopy, just put

each new disk in the drive at the appropriate time and press the Enter key. This is a great time-saver.

You can set the program to either format each target

disk automatically or only format those that aren't formatted already. It uses an internal format routine that seems quite fast. If you don't choose to format the target disk, DCopy erases the data it contains by writing a new file allocation table (FAT) and root directory before it starts storing data. You also can choose whether you want DCopy to verify each file, byte for byte, as it is written.

I like DCopy. It is fast and simple. Its lack of printed documentation (or a documentation file for the user to print) isn't a handicap because it is so easy to use. It does have on-line help if you need it, but you may never have to press F1 for help, even if you use all of DCopy's features. If you copy disks regularly, or all of the files from one disk to another, this little program is a bargain at \$15.

Perfecting WordPerfect

I've just happened upon a utility that uses only 1,568 bytes of conventional (and no upper) memory on my 386, takes me out of WordPerfect 5.1 to any program of any size in two seconds, and returns me in one sec-

(Continued on page 68)

DCopy is a top-notch floppy-disk copier that eliminates disk swapping.

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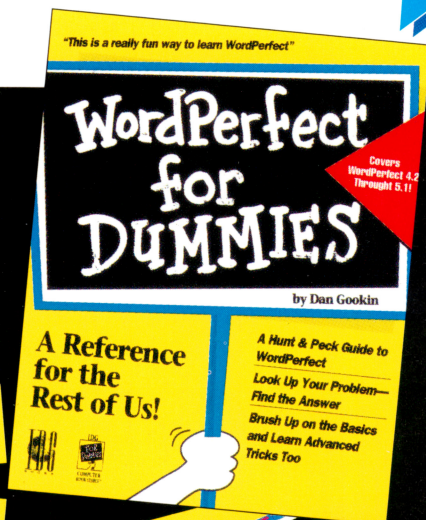
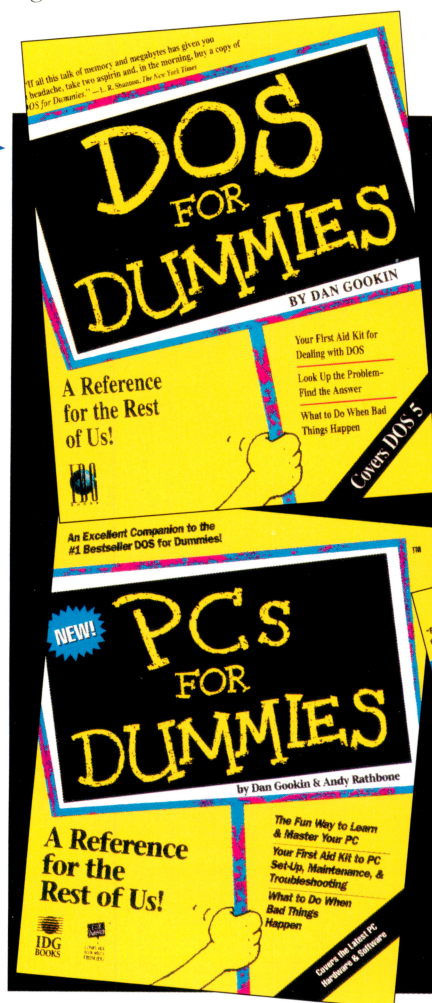
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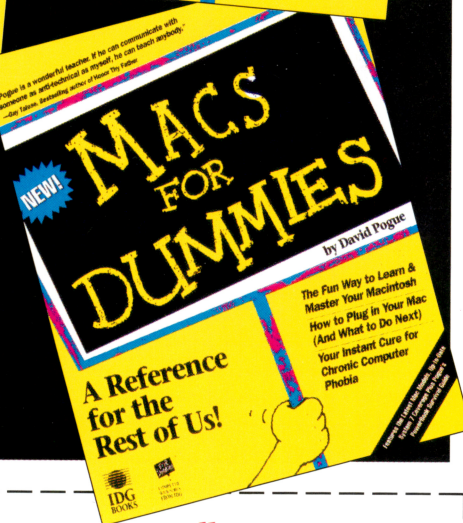


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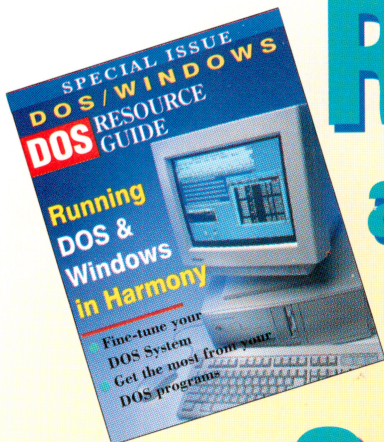
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